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COMPUTERWORLD

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BULLETIN:
An IBM executive said last week that he expects the OS/2 operating system to ship before the end of the year, ahead of its original first-quarter 1988 schedule. Page 4.

Stock crash thrashes CPUs, operators

BY JEAN S. BOZMAN
CW STAFF

As stock exchanges throughout the country struggled to cope with record volumes of shares traded last week, computer operators fought exhaustion, hunger and glitches to keep pace with the work load. Tickers ran one to two hours late and confirmation orders were missing in action for 24 hours or more — but most stock exchange CPUs kept on running.

After the fall

- Network managers scramble; slowdown could crimp rebounding computer industry; MIS ponders impact. Pages 144, 145.

The fundamental problem was that with computers straining under the burden of processing hundreds of millions of shares, their I/O devices simply could not keep up. Stock exchange MIS managers agreed that there was insufficient space in the output queues and insufficient capacity in aging front-end processors. These factors combined to make stock tickers maddeningly slow — and output to brokers' terminals wildly inaccurate.

The frenzied trading pace prompted the New York and American Stock Exchanges to halt trading two hours earlier than usual from last Friday through tomorrow to give all affected companies time to process and execute the enormous volume of transactions.

It was often people, not computers, who could not cope with the increase in volumes at the regional exchanges. In Boston, last Monday's volume doubled to five million shares; in California, the Pacific Stock Exchange volume on Monday jumped from 10 million shares to more than 17 million shares; and in New

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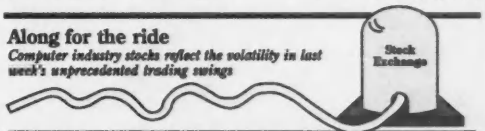
Along for the ride
Computer industry stocks reflect the volatility in last week's unprecedented trading swings



	Oct. 16	Oct. 19	Oct. 20	Oct. 21	Oct. 22	Oct. 23
IBM	135	103-1/4	115	122-3/4	120	120-3/4
DEC	172-1/4	130	134-1/4	144-7/8	133-1/2	127
Microsoft	64-1/2	45-1/4	48	56-5/8	53-1/4	48
Lotus	32-1/4	26-1/4	26-1/4	30	26-1/4	24-3/4
Apple	48-1/4	36-1/2	34-1/2	40-3/4	36-3/4	35-1/4
Compaq	62-1/4	49-1/4	50	55-1/2	52	49-1/2
Unisys	38	30-1/2	32	33-5/8	29-7/8	30-1/4
Computer Associates	28-1/4	21-1/4	20	26-1/8	22-7/8	21-3/4
AT&T	30	25-3/8	27-1/2	29-1/2	28-3/4	28-7/8

CW CHART: MITCHELL J. HAYES

Mac, 386 in Comdex limelight

BY ALAN J. RYAN
CW STAFF

Macintoshes and 80386-based personal computers will own the exhibit floor when the mammoth Comdex/Fall '87 begins in Las Vegas next week. And while OS/2 applications may dominate back-room discussion, those planning to attend said they will be looking for software they can use here and now.

At this past spring's Comdex show, more than 30 Intel Corp. 80386-based products were on display, "and I would expect to see twice that number at the fall show," said Jerry Schneider, president of the Capital PC Users Group in Washington, D.C.

With the return of Apple Computer, Inc. to Comdex/Fall

Continued on page 143

Netview keys 9370 data transfer

BY STANLEY GIBSON
CW STAFF

NEW YORK — Forging more links in the growing chain of Netview functions, IBM last week announced a Netview interface for its Personal System/2 machines and added features that allow network operators to distribute software, analyze data and transmit large data files.

The enhancements, many for VM-based systems, reportedly allow IBM 9370 Netview nodes to play a bigger part in a network and increase the ability of corporate users to manage 9370s and other nodes remotely.

Some of the Netview functions under VM are a year away, however, and a strategic product for bulk data transfer was announced only for MVS hosts.

Netview File Transfer Program Release 1.0 for MVS allows an operator to send up to 32 files simultaneously between systems.

Bulking up 370

The product is the successor to IBM's File Transfer Program Version 2.2 MVS. IBM said the offering is a strategic product for high-performance bulk data transfer in an IBM Systems Network Architecture 370 environment. It is set to be available in the fourth quarter of 1988.

Although IBM called the program strategic, it is currently supported only under an MVS host — not under VM. However, it can manipulate files between remote MVS and VM machines, IBM officials said.

"It's a bit of a surprise that bulk data transfer has been brought under Netview," said Dixon Doll, president of the DMW Group, Inc. in Ann Arbor, Mich. He said IBM will likely offer the program under VM at a later date.

Clare Fleig, an analyst at the International Technology Group in Los Altos, Calif., said the product is consistent with IBM's strategy of giving corporate users greater control of departmental nodes from a central site. "It enables the user to not keep a computer professional posted at the 9370 site," she said.

Continued on page 6

Gaps filled in VM plan

Enhancements proliferate, but deliveries lag

BY CHARLES BABCOCK
CW STAFF

NEW YORK — IBM appeared to be furiously filling in the blanks on the distributed capabilities of its 9370 mid-range processor last Tuesday with software products due for delivery during the next 12 to 19 months.

The announcements included a version of CICS that runs under IBM's VM and is scheduled as a production system in the first quarter of 1989. CICS/VM adds transaction processing capabilities to the 9370, although it is not believed to be able to sustain more than 60 transactions per minute, said Robert P. Tasker, chief computer analyst for The Yankee Group in Boston.

"These announcements don't set the world on fire, but they keep people interested in the 9370 as a distributed processing machine," Tasker said.

An estimated 5,000 to 6,000 9370s are going to be shipped by the end of this year. Both IBM and industry analysts have portrayed the machines as mid-range departmental-type processors with ties to IBM's 370 mainframe family. Many of the ties have only been loosely defined, however, and IBM is clearly scrambling to fill in the gaps, analysts said.

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NEWSPAPER

SECOND CLASS

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Lukewarm reception. Wang completes VS revamp with introduction of four low-end systems pitted against Microvax family, but current VS users don't like what they hear. Page 10.

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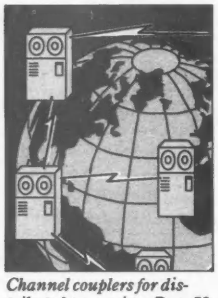

Channel couplers for distributed processing. Page 53.

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"We were glued to our control room day and night. We ate so much pizza that I never want to see another slice again."

DAN MCGUIRE
MIDWEST STOCK EXCHANGE

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"The need for information seemed to be like a lifeline."

DICK LEVINE
DOW JONES NEWS RETRIEVAL SERVICE

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SPOTLIGHT

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Aftershock in Frisco

Bankamerica MIS chief Mertes quits suddenly

BY KATHY CHIN LEONG
CW STAFF

SAN FRANCISCO — After less than two years at the helm of Bankamerica Corp.'s worldwide computer activities, Louis H. Mertes, 48, suddenly resigned late last week.

While the bank would not detail the reasons for Mertes' departure, observers speculated upper management forced the resignation as a result of problems that occurred with Masternet, a computer system that keeps track of the bank's pension plan. Bankamerica public relations spokeswoman Catherine Moss dismissed the speculations.

She did acknowledge that in the second fiscal quarter, the bank wrote off $25 million to correct problems associated with converting from a 20-year-old mainframe batch system to a new IBM mainframe. Moss would not specify the mainframe model.

Mertes' departure is the second major personnel move in recent years. In November 1985, Mertes' predecessor, Max Hopper, left to return to American Airlines after less than 10 months at the post.

Bankamerica lured Mertes from its Seafirst Corp. subsidiary, where he was instrumental in bringing Apple Computer, Inc. Macintosh computers into the corporate environment.

The goal of the Masternet system was to offer on-line inquiry and updating capability and ultimately give customers up-to-date portfolio data. Moss stressed that customer data was never lost on the new system and that the majority of problems concerned delayed statement delivery. The system is still operating today, and the bank is working to resolve technical problems, Moss said.

Business as usual

Moss added that Mertes' departure will not affect any of the current MIS projects in the Bankamerica Systems Engineering group. "We foresee no change at all in the direction of the department," she said.

In a recent interview, Mertes acknowledged that a few of the bank's key priorities were to network branches with IBM Token-Ring local-area networks and to focus energies on a global data network scheduled for completion by the end of 1988.

With at least 20 projects still under development, the bank has not selected anyone to fill Mertes' position. When Mertes was brought on board, his chief goal was to reduce cost. The day after he resigned, the bank reported $54 million in earnings for the third quarter ended Sept. 30, compared with a $23 million loss in the prior year.

Landi joins *Computerworld* as VP/associate publisher

CW Publishing, Inc. has announced the appointment of Val Landi as vice-president/associate publisher of *Computerworld*.

Before joining CW, Landi, 41, was advertising director of *Electronic News* in New York. He was previously a publisher and editorial director with Bantam Books, Inc., where he created the award-winning *Great Outdoors* travel guide series. Landi began his career with Metromedia Broadcasting Corp. in New York and Washington, D.C.

Landi foresees a very proactive role for CW in serving the MIS and data processing community. "In order to be successful, CW has to become part of the fabric of the industry," he said.

"We have to be the thought leader. The MIS function is becoming more important than ever in corporate America. We must define the issues, provide a forum for industry leaders to discuss them and be *the* news source for the decision makers on the MIS/DP side."

Val Landi

Landi said he believes that in the wake of the personal computer revolution, MIS departments have more responsibility than ever. "In major issues like volume PC buying and networking, the whole pendulum is swinging back to MIS," he said.

Landi and his wife Ann, a senior writer for *Manhattan Inc.* magazine and a free-lance journalist, will be relocating to the Boston area in the near future.

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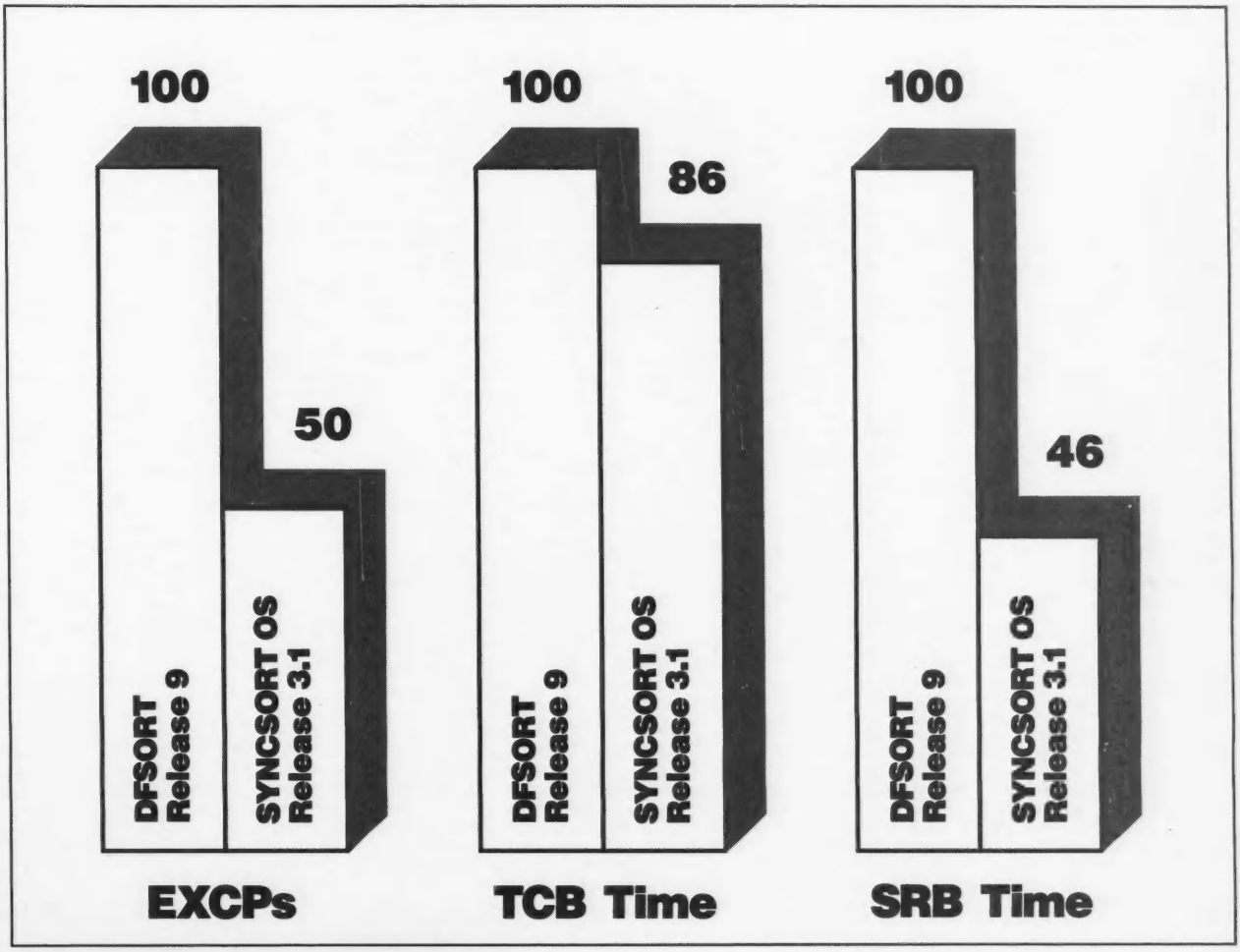

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Air Force can specify Unix system for bids

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The U.S. Air Force can require bidders for a $4.5 billion minicomputer contract to supply a Unix-like operating system meeting AT&T's System V Interface Definition (SVID), a federal appeals board ruled last week.

The precedent-setting decision may help MIS managers at federal agencies resolve a fundamental dilemma: how to specify Unix so they can improve the portability of applications software without running afoul of government rules against specifying particular brand names.

The General Services Administration's Board of Contract Appeals rejected arguments made in an official protest by Digital Equipment Corp. that the Air Force specification violated competitive procurement rules by favoring AT&T's proprietary Unix System V operating system.

The board's ruling represented a split decision for DEC and Wang Laboratories, Inc., which had joined in the protest. Although the appeals board rejected most of DEC's protest, it agreed with the company that the Air Force specification was ambiguous and showed some bias toward AT&T.

The board expressed concern that the Air Force will be using AT&T's proprietary System V Validation Suite to determine how closely a vendor's offering matches the SVID. The board required the Air Force to clearly identify which of the SVID's 600 features will be given the greatest weight in the evaluation.

AT&T review?

Prior to the ruling, Wang Chairman Frederick A. Wang claimed the Air Force specification would result in vendor proposals effectively being evaluated by AT&T, which itself was a bidder. He also said the specification did not address the issue of voice integration, which his company has focused on in recent marketing campaigns, and suggested the system should not be constructed to cover a 10-year period, "or maybe it shouldn't be so all-encompassing."

The ruling said the SVID, although developed by AT&T, has become a standard industry interface for a variety of Unix-like operating systems and is not limited to AT&T's System V.

"In the final analysis, we reject the argument for the simple reason that the SVID, notwithstanding its origin, truly is a de facto voluntary industry standard for a class of operating systems rather than solely the proprietary product of a single vendor," the board said.

Jack Biddle, president of the Computer & Communications Industry Association, called the ruling a victory for users and vendors that support open operating systems, such as Unix, that are freely licensed to a variety of vendors and promote software portability.

"For those vendors who have had a comfortable life locking a customer into a proprietary architecture, this decision is bad news," said Biddle, whose association supported the Air Force position in the case [CW, Oct. 19].

Massive contract

The case involves Air Force Computer Acquisition Center Project 251, a massive contract for roughly 20,000 multiuser systems, complete with office automation software, wide-area and local-area networks and user training. The contract appeals board halted bidding on the contract in response to DEC's protest [CW, Aug. 24].

The Air Force is requiring that the 32-bit systems run, in the native mode, a Unix-like operating system conforming to the most important features of AT&T's SVID.

The SVID is an interface between the operating system and applications software that defines the functions of Unix-like operating system components but does not define the internal workings of the operating system.

In the Air Force procurement, vendors are not restricted to proposing AT&T's Unix System V operating system because a wide variety of Unix-like operating systems can meet some portion of the SVID standard, according to the decision written by Vincent A. LaBella, an administrative law judge.

The Air Force said it required SVID compatibility for three related reasons: the need for software portability, to avoid being locked into a single hardware vendor; some agency software has already been developed under SVID guidelines; and the emerging federal standard for Unix systems, called Posix, is expected to be highly compatible with SVID.

Frank Donovan, spokesman for DEC's government systems group, said the vendor was pleased that the board "has sustained in vital respects" the DEC protest and noted that the Air Force must revise its specification to meet the board's objections before resuming the procurement and accepting bids.

DCA, Hayes link up on Irma

Tie DCA communications to Hayes modem

BY JAMES A. MARTIN
CW STAFF

REMOTE, Ore. — Digital Communications Associates, Inc. (DCA) and Hayes Microcomputer Products, Inc. last week jointly announced Irmaremote, a DCA software interface that brings the firm's Irma micro-to-mainframe communications capabilities to Hayes' 2,400 and 9.6K bit/sec. modems.

Separately, DCA also announced a version of Irmaremote that enables IBM Personal Computers to connect directly with a mainframe through a CCITT X.25 packet-switching network.

DCA's Irmaremote is said to enable IBM PCs equipped with high-end Hayes modems to function as remote IBM 3270 workstations linked to an IBM mainframe. Irmaremote incorporates the Hayes Synchronous Driver to access the Hayes Autosync feature, which allows modems to communicate synchronously using a standard PC asynchronous communications port.

Irmaremote, coupled with Hayes modems, reportedly offers synchronous communications from a microcomputer without the need for direct leased lines, synchronous data link control and bisynchronous boards or synchronous modems.

Irmaremote is said to supply the end user with an Irma software interface between the modem and the mainframe. It offers the same functions and features as DCA's Irmacom 2 Systems Network Architecture product, announced early this month.

Irmaremote software will be available in January for $395. DCA is originally releasing the package in a 5¼-in. format for PCs. A 3½-in. format is expected around April 1988 for IBM Personal System/2 models.

Significant pair

Some analysts said the significance of the announcement was the pairing of Hayes and DCA. "The 3270 emulation market is not a strong growth area, with maybe only about a 6% rise in sales annually," said Larry Cynar, a communications analyst for Dataquest, Inc. "So the important factor is, Hayes can sell more modems, and the two can share technologies to address a shrinking market."

A Hayes 2,400 or 9.6K bit/sec. or V-series modem is required on the PC side, and a Hayes-compatible modem can be used on the mainframe side.

The Irmaremote X.25 Multidrop Gateway is a software and hardware package that DCA has licensed through an OEM agreement with Comtes GmbH in West Germany. DCA has added its file-transfer and terminal-emulation capabilities to Comtes' X.25 software.

The product will be available outside the U.S. in January and in the U.S. by late 1988 for $1,795, according to the vendor.

Earlier delivery set for OS/2

BY JAMES A. MARTIN
CW STAFF

REDWOOD CITY, Calif. — IBM's top Personal Computer executive last week said he expects the company to deliver its next-generation OS/2 operating system before the end of the year, rather than in the first quarter of 1988, as originally planned.

"In April, we announced the [OS/2] Standard Edition delivery for first-quarter 1988, and I expect that we will ship it this year," said William Lowe, president of IBM's Entry Systems Division, in a speech to the American Electronics Association. Lowe said that a delivery schedule for OS/2 will be announced "in the next several weeks."

Lowe was not available to elaborate on his statement. IBM officials could not be reached for comment at press time.

OS/2 has been scheduled to ship to OEMs by the end of the year, but it was not expected to reach end users until the first quarter of 1988. Also in this quarter, IBM is scheduled to announce the availability of OS/2 Extended Edition, and Microsoft Corp. and IBM say they plan to announce a shipment date for OS/2 Presentation Manager.

Steve Ballmer, vice-president of systems software for Microsoft, said it makes sense for IBM to ship OS/2 before compatible makers deliver it. "I would expect to see IBM ship before anybody else," he said.

OS/2 is expected to take advantage of the multiprocessor capabilities of IBM's Personal System/2 line and its Micro Channel architecture. Although reports differ on the PS/2's success in the market, Lowe said that one million PS/2 units have been shipped as of this month, approximately 65% of them within the U.S.

In a wide-ranging speech, Lowe also said IBM plans to position a Unix workstation platform between the PS/2 Model 80 and the RT Personal Computer and 9370 series of minicomputers.

Senior Editor Douglas Barney contributed to this report.

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Plot to sell supercomputer plans to USSR charged

BY JULIE PITTA
CW STAFF

SAN JOSE, Calif. — A former employee of Saxpy Computer Corp., a Sunnyvale, Calif.-based supercomputer company, has been accused of attempting to sell technology allegedly stolen from Saxpy to the Soviet Union.

According to the Federal Bureau of Investigation, Ivan-Pierre Batinic, a Saxpy software engineer who resigned last month, was arraigned last week on charges of stealing trade secrets and conspiring to sell them to Soviet officials for $4 million.

Three others — Batinic's brother Stevan; Kevin E. Anderson, also a computer software designer; and Charles McVey, who was arrested last month for allegedly selling both technology and computers to the Soviets for more than 10 years — were arraigned.

In a prepared statement, Richard Held, the director of the FBI's San Francisco office, noted that the technology has "a direct military application" and would be detrimental to national security.

The technology would allow the Soviets to build supercomputers able to "anticipate missile strikes," Held said in the statement.

'Architectural issue'

A Saxpy spokesman said Batinic allegedly pilfered documents regarding the operating system for the company's Matrix 1 supercomputer. "It's an architectural issue," he explained. "This technology is an evolutionary step from vector to matrix processing. We can glup large quantities of data rather than accepting them in strings of data, or vectors."

The spokesman said Saxpy's matrix supercomputer allows "thoroughbred processing speed. It's number-crunching at the highest level."

Saxpy sells the computer to customers who are interested in geophysical, seismic processing and signals processing applications. Among the company's customers is Martin Marietta Aerospace, a defense contractor based in Maryland.

Tool builds AI into CPU

BY CHARLES BABCOCK
CW STAFF

WASHINGTON, D.C. — By the end of the year, IBM plans to offer an expert system tool with PL/I-type programming capabilities for adding human expertise to applications running against mainframe data bases and file systems.

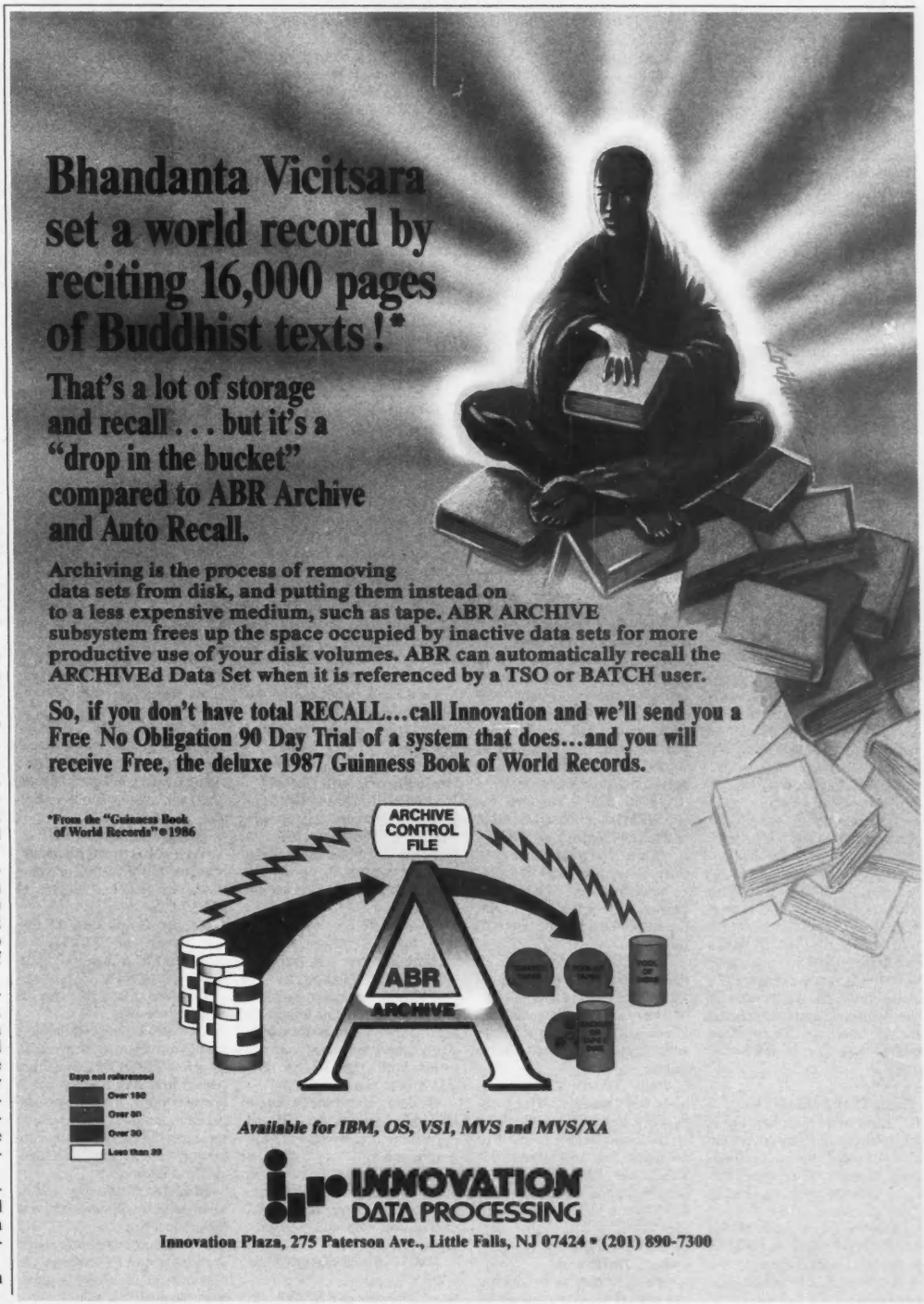
Dubbed Knowledgetool, the product addresses programmers familiar with the standard IBM CICS/OS/VS, IMS/VS, MVS/XA, VM/SP and VM/SP High Performance Option operating systems. Applications built with Knowledgetool can access IBM's DB2 and SQL/DS relational data base management systems and the VSAM and DL/1 file management systems.

The product was demonstrated last week at the CASE Expo in Washington, D.C., where 2,000 lines of a Knowledgetool expert system invoked 100 rules to solve different combinations of Rubik's cube.

Anthony Cruise, co-developer of the system at the Thomas J. Watson Research Center in Yorktown Heights, N.Y., said applications developed with the product are compiled for faster performance than that of traditional expert systems. Such applications can also access large amounts of data without impeding runtime speed, he claimed.

Applications built with the expert system shell can be used with applications written in IBM's VS Cobol II, PL/I, assembler, Fortran and Pascal.

The product will carry a monthly license charge of $950.



System/36 line grows; System/38 prices cut

BY STANLEY GIBSON
CW STAFF

NEW YORK — IBM rolled out a new entry-level System/36 last week and cut prices on some System/38 models and upgrades. Other System/38 upgrade prices were increased.

In addition, IBM quietly began a new leasing program in which System/36 and 38 customers may break their leases with reduced penalties if they switch to a machine using a different IBM technology. The program is seen as a way of attracting customers to System/36 and 38 processors before the 1988 rollout of the so-called Silverlake machine, which IBM describes as the System/3X follow-on.

The new System/36, the Model 5363, essentially replaces the System/36 PC (Model 5364), although IBM will still offer the older machine.

The 5363 is similar to the 5364 but includes an embedded personal computer and can have the SSP operating system installed at the factory. With the 5364, a user had to attach an IBM Personal Computer or compatible machine or a Personal System/2 to the computer in order to intall the operating system and use the processor.

IBM said performance of the 5363 falls between that of the 5364 and the 5362.

The 5363 is offered with 1M byte of memory standard, compared with the standard amount of 256K bytes with the 5364. However, while the 5364 can grow to 1M byte, the 5363 cannot grow beyond that. The 5363 can handle 28 local displays or printers, compared with a maximum of 16 for the 5364.

"Without the PC, it makes it a lot easier. For users, it will be worth the extra money to have the operating system included," said John McGilvreay, director of customer services at K & C Systems, Inc., a Woburn, Mass.-based development firm specializing in the System/36 PC.

The 5363 can contain one or two 65M-byte disk drives or one or two 105M-byte drives for a maximum of 210M bytes, which exceeds the 5364 maximum disk storage of 130M bytes. The 5363 disk drives come mounted in the system cabinet. A user cannot connect external direct-access storage devices to the processor, IBM said.

Available this Friday, the 5363 starts at $10,000 without the preloaded operating system and runs to about $15,000 for a typically configured system, IBM said.

System/38 price shuffle

In reshuffling prices for the System/38, IBM announced decreases for Models 200 and 700 ranging from 4% to 20%, as well as decreases for memory and upgrades. The price changes became effective last Tuesday.

IBM cut System/38 memory prices from $5,000 to $3,500 per megabyte. IBM also raised the prices for System/38 upgrades from the original family of System/38 Models 5, 7 and 8 to enhanced Models 200, 300 and 400. The upgrade increases range from about 2% on some models to more than 20% on others.

IBM cut prices on upgrades to System/38 Models 600 and 700 up to 20%. Upgrades to a Model 600 must be from a Model 6, 8, 20 or 400. Upgrades to a Model 700 must be from a Model 6, 8, 20, 40, 400 or 600.

The new leasing plan, called the Technology Exchange Option, began last Tuesday. The option is available to all System/38 customers and users of the System/36 5360 and 5362 models. Under a three-year lease from IBM, users of those systems can exchange their processor for a different IBM technology after one year, an IBM spokesman said.

The Model 5363

A compact entry-level System/36 that IBM said can be installed and up and running within one hour

Still offered 5364	New 5363
Separate PC required to load operating system	Preloaded operating system PC components embedded in product Can use with System/36 display, PC or PS/2
256K bytes to 1M byte	1M byte of main storage
16 displays or printers	Up to 28 displays or printers
Up to 130M-byte disk	Up to 210M-byte disk
Price (excluding required PC and operating system): $5,995 to $11,195	Prices (including preloaded operating system): $10,995 (65M-byte disk); $12,095 (105M-byte disk)
Three-month warranty Mid-Range System Amendment not available (no maintenance discount)	One-year warranty Mid-Range System Amendment available (maintenance discount)

CW CHART

Gaps filled in

FROM PAGE 1

At the University of Quebec, data processing director Jean Lapointe said the availability of CICS under VM will allow the school to move some of its existing CICS applications onto its 9370 processor.

IBM also announced VM/SP Release 6, the first VM operating system with the capability to share IBM Conversational Monitor System (CMS) files both within a VM operating system and across VM systems.

Theoretically, VM/SP 6 on a mainframe opens the possibility of CMS file sharing with a 9370 running VM/IS, the version of the operating system designed for the machine, Tasker said. VM/SP 6 is due in December 1988.

'Thorn in the side'

"The lack of file sharing has been a long-standing thorn in the side of VM users," said Gabe Goldberg, director of technology at the VM Systems Group, Inc. in Arlington, Va.

Another major piece of the 9370 puzzle filled was VM/IS Release 5.1, with increased ease of installation and remote control features.

Like the first release of VM/IS, which was based on VM/SP 4, the new system's core is made up of VM/SP 5, but it trails the latest mainframe version. It has received added communications and connectivity functions and was designed to work with IBM's enhanced networking product, Netview.

VM/IS 5.1 is required for CICS/VM but is not scheduled to be available before May 1989.

"No one is going to do anything before mid-1989. It's a little bit depressing," said Peter A. Levine, vice-president of the Gartner Group, Inc. in Stamford, Conn.

Promises aren't enough

"IBM says its customers like to do a lot of advance planning. Customers also like to have products when they need them," Levine added.

Until Tuesday's announcement, 9370 users faced the prospect of running CICS under VSE on the new machine in order to do transaction processing. But VSE lacks VM's communications features, so users were likely to run VSE as a guest under VM, a practice that consumes 22% of the machine's resources, Tasker said.

"Nothing they've announced has an overwhelming impact on my business right now," said Sheldon Danto, a business manager for GTE Corp.'s Data Services division, a 9370 user.

Danto said, however, that he liked the announcement's overall direction toward distributed processing.

Have library, will travel

In addition, IBM has included the Callable Services Library in VM/SP 6. The library will replace the assembler subroutines formerly written by programmers to access VM functions and services.

When different sites write their own assembler routines, applications are not portable among sites, Goldberg said.

VM/SP 6 also features bimodal CMS programming interfaces that allow a programmer to write applications that can run under both the VM/SP and VM/XA environment.

Goldberg called the feature a "bridge" between the SP and XA worlds that would ease migration to XA.

CICS/VM reportedly will be priced at $1,500 a month or carry a one-time charge of $18,000 to $72,000, depending on processor size.

VM/SP 6 will be priced at $500 a month or carry a one-time charge of $7,740 to $30,950, depending on processor size.

VM/IS 5.1 will be priced at $2,381 a month or carry a one-time charge of $28,200 to $106,620.

In addition, IBM announced Version 2 Release 1.7 and Version 3 Release 1.2 of VSE, providing support for IBM 4381 and 3380 processors and peripherals.

Both are due in March.

Version 2 is to carry a monthly license fee of $2,608 or a one-time charge of $29,315 to $102,740.

Version 3 will cost $2,608 per month or $23,110 to $76,475 for a one-time purchase.

Both are priced the same as previous versions.

IBM also announced that it is trying to accelerate the availability of its IMS/VS Version 2.2 Extended Recovery Facility, which provides improved recovery capabilities for large IMS users, by replacing the Early Support Program for the product with managed availability.

Managed availability means selected sites will start receiving the product Nov. 16.

No announcement on general availability will be made in the first quarter of 1988, as previously planned, IBM said.

Netview

FROM PAGE 1

"It significantly expands the number of places where using a 9370 is the right solution," said Bob Anderson, IBM's marketing manager for Netview.

Netview/PC Version 1.1, announced in June, was enhanced to support PS/2 Models 50, 60 and 80. Enhancements allow the machines to serve as Netview nodes, reporting data that has been gathered on attached network devices to a Netview host.

IBM also announced the Netview Distribution Manager (DM), which allows a central network operator to distribute data and software changes in an SNA network under IBM's MVS/XA, MVS/370 or VM/SP. The product supersedes the company's Distributed Systems Executive (DSX).

Netview DM can support a VM host, whereas DSX could not. With the new program, a 9370 running VM can use DM to distribute software to other systems. Netview DM also supports the following network extensions: VM end nodes, IBM System/36s acting as intermediate nodes, System/36 end nodes connected to a central site via System/36 intermediate nodes and IBM PC-DOS end nodes connected to a central site via System/36 intermediate nodes.

Netview DM is slated to be available for MVS hosts in June 1988, for VM nodes with MVS hosts in September 1988 and for VM hosts in November 1988.

Analyst lets monitors talk

IBM also announced the Netview Performance Monitor (NPM) Version 1 Release 3, a Netview version of the firm's NPM, which monitors, collects and analyzes network performance information. Due in December, it adds VM support and allows two performance monitors to talk to one another.

"This has been around a long time, but it was not part of Netview. Customers did not have access to it through their Netview console," said Frank Dzubeck, president of Communications Network Architects, Inc.

IBM announced the 5822 Data Service Unit/Channel Service Unit (DSU/CSU) for digital networks and a Netview interface for that product. DSU/CSU should be available in second-quarter 1988. IBM also introduced Netview support for its 3737 Channel-to-Channel unit.

The enhancements are priced separately from other Netview components and are not offered as upgrades to current Netview users, IBM said. Pricing is graduated according to the size of the processor.

"These are necessary missing entities. These tweakings of Netview are going to continue ad infinitum," Dzubeck said.

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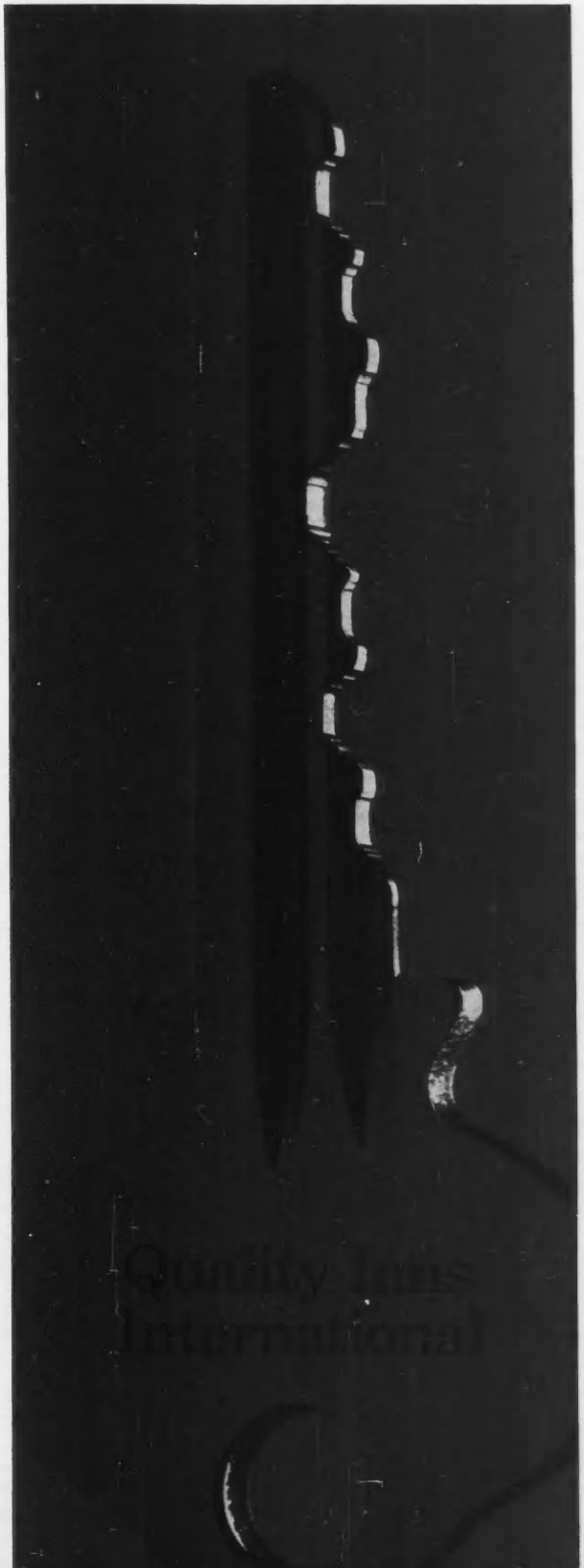

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MIS top dog when buying PCs

BY ED SCANNELL
CW STAFF

FRAMINGHAM, Mass. — An exhaustive survey of the acquisition and usage patterns of microcomputers by large corporations revealed that DP/MIS departments have the greatest influence on microcomputer purchasing decisions.

The survey, conducted by Stat Resources, Inc. for International Data Corp. (IDC), showed that a little more than three-quarters of the personal computer executives surveyed reported that they worked in MIS departments or related functional areas.

The report confirmed the findings of a study conducted earlier this year among large corporations by *Computerworld* [CW, March 9]. That report showed MIS, or the information center (considered a part of MIS), as controlling or specifying microcomputer acquisitions in three-quarters of the firms polled.

"It is often claimed that MIS/DP overstates its role in the process of purchasing PCs, but what is interesting is that functional managers [those not directly involved with PCs] of various departments are also saying that MIS/DP has a big role," said Susan Ellerin, president of Stat Resources.

"A substantial number of companies have defaulted to the information technologies group for the official policy-making on personal computers," said Tom Willmott, vice-president of IDC's PC/Micro Research Group.

Ultimate control

A microcomputer manufacturer interviewed last week said the survey's findings accurately portrayed MIS departments' prominent role in providing ultimate control over purchasing decisions.

"I think MIS is very much involved with the decision-making process by design, because they understand better than anyone else the issues of connectivity," said David Chavalier, director of national account marketing for PC's Limited.

While MIS groups generally give final approval to microcomputer purchases, Chavalier added that they are not as involved as they should be in long-term planning strategies of microcomputers.

"MIS's strength is helping the PC plan walk down the same path as the glass-house [MIS] plan," Chavalier said.

No control

Two MIS executives interviewed last week held divergent views on the study. One said his company's microcomputer purchasing and policy decisions were set by MIS. The other, an information center manager, indicated MIS had virtually no control over his company's microcomputers.

"We set the standards here by which everybody lives. We have the best position here to see how PCs work, especially in the connectivity area," said Al Small, senior administrator of PC Technical Support for Aetna Life & Casualty Co.

At Continental Grain Co., however, information center manager Larry Stouder said his department is a replacement for MIS in the use of microcomputers. He said the only time MIS gets involved with microcomputers is when they are being connected to mainframes.

The Stat Resources-IDC survey, however, showed that most PC executives (88%), department heads (89%) and PC users (80%) feel that they have a significant amount of input in determining their corporations' computing needs.

However, 79% of PC executives surveyed said that they believed they were the individuals who determined the specifications for PCs, compared with only 47% of the department heads.

An interesting finding was that users said accessing a mainframe is easier than using a local-area network, installing an expansion board or modifying a menu.

Other highlights of the survey included the following:

- Despite the almost 4-to-1 ratio of IBM Personal Computers to compatibles today, corporate PC executives said that they plan to acquire an average of 36 IBM PCs and 22 compatible systems during the next 12 months, which brings the ratio down to 5-to-3.
- Only 5% of the PC users said they use the various models of Apple Computer, Inc.'s Macintosh.
- Of the PC users, 37% said they use PCs 20 or more hours a week.
- Of the PC executives surveyed, 87% agreed or strongly agreed that only one department should have responsibility for PCs. Of the users surveyed, 78% agreed or strongly agreed.

Current PC applications

Percent of respondent companies[1] using selected software applications on PCs

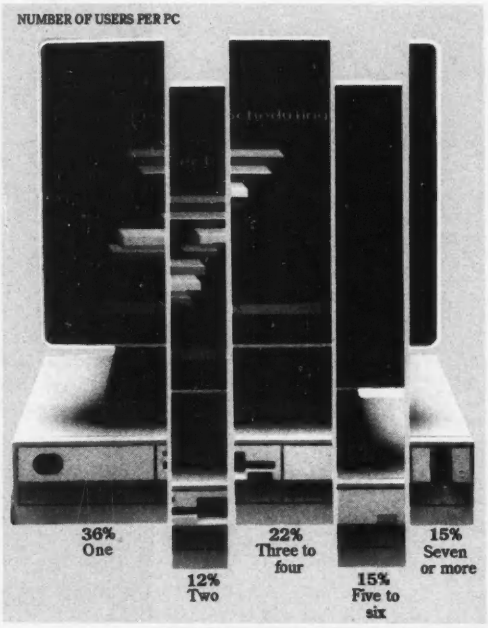
Accounting	65%
CAD/CAM[2]	29%
Data base management	87%
Desktop publishing	27%
Electronic mail	27%
Financial analysis/modeling	67%
Graphics/business drawing	72%
Inventory control/management	30%
Local-area network	42%
Micro-to-mainframe software	77%
Personal productivity	42%
Project management	54%
Spreadsheet	97%
Statistical/scientific	36%
Windowing	37%
Word processing	93%

[1] Revenue group equals $100 million or more
[2] Computer-aided design and manufacturing

INFORMATION PROVIDED BY A SURVEY OF 195 PC EXECUTIVES

Playing partners

The majority of PC users share their machines with one or more co-workers



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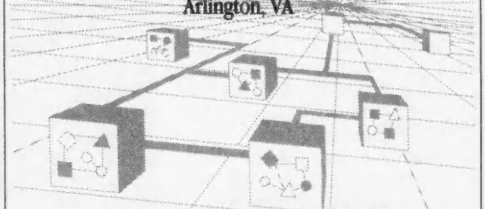

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Low-end intros cap Wang mini tune-up

BY JAMES CONNOLLY
CW STAFF

BOSTON — Wang Laboratories, Inc. completed the revamping of its VS family of minicomputers last week with the introduction of four lower end systems designed to outperform the existing VS 5, 6 and 65.

The processors, pitted against Digital Equipment Corp.'s Microvax family, were introduced at the same time that Wang officials outlined two-year product strategies at the International Society of Wang Users Conference.

Wang unveiled the VS 5E, 6E and 75E and said these machines support up to twice as many users as did the models they replace, in large part because of the use of new disk subsystems. Wang also announced the VS 7010, which overlaps the performance range of the VS 75E while providing an entry point to the VS 7000 family introduced in January.

Bob Ano, Wang's senior vice-president of corporate marketing, described upcoming products, including the following:

- The December introduction of a dual-processor high-end system known as the VS 7320. Wang said that system would be announced by year's end when the VS 7000 family bowed in January.
- A resource-sharing facility, comparable to DEC's Vaxcluster product, to be announced in early 1988.
- A virtual machine feature comparable to IBM's VM to be announced for VS 7000 systems when the VS 7320 is introduced.
- A family of 32-bit workstations to be introduced before July. They will run an industry-standard operating system, will be tightly coupled with Wang VS through co-processors and will be aimed at areas such as financial services rather than engineering, according to Ano.
- A family of custom very large-scale integration-based systems — probably starting with CMOS-based models in the performance range of the lower end VS 7000 systems — to be announced by July and followed by larger emitter-coupled logic-based systems.

A key difference between the VS 5E and 6E and the models they replace is direct support for higher capacity disk drives through the small computer systems interface.

The VS 5E and 6E feature 72M- and 145M-byte disks and an internal disk capacity of 435M bytes, which is triple the capacity of the 18-month-old VS 5 and 6.

The company said the VS 75E uses a 10-MHz bus in place of an 8-MHz bus and features a serial device controller to support more users than the VS 65E.

Wang called the VS 7010 a bridge between the office and computer room and said that the VS 7010 provides 40% more power than the VS 75E.

Base prices for systems with minimum memory and disk capacities and VS licenses are $13,000 for the VS 5E, $22,000 for the VS 6E, $44,000 for the VS 75E and $75,000 for the VS 7010.

Splitting the deck

Wang's new lineup features support for additional users at various points of the VS series

	Wang VS 5E	Wang VS 6E	Wang VS 75E	Wang VS 7010	DEC Microvax 3500	DEC Microvax 3600
Maximum users	16	32	64	96	NA*	NA
Typical users	Four to eight	Six to 16	40	30 to 55	NA	60
Memory range (bytes)	1M to 2M	1M to 4M	2M to 8M	4M to 32M	16M to 32M	32M
Cache memory (bytes)	None	32K	32K	32K	65K	65K
Instruction time	480 nsec	200 nsec	240 nsec	240 nsec	90 nsec	90 nsec
Disk capacity (bytes)	1.7G	1.7G	3.9G	5.4G	560M	1.8G
Base price	$13,000	$22,000	$44,000	$75,000	$74,800	$99,800

*Not available

INFORMATION PROVIDED BY WANG LABORATORIES, INC. AND DIGITAL EQUIPMENT CORP.
CW CHART

Voices of dissent

Users of Wang Laboratories, Inc. systems last week said they had expected the VS 7010 and new versions of the VS 5 and 6. Several expressed surprise, however, that the VS 75E will replace the VS 65.

"Is the 75E an outright replacement for the 65? If it is, I have a problem with that. Is Wang going to do what IBM does and dictate the way we are going to go?" asked Stan Leader, manager of office technology for Capital Blue Cross in Harrisburg, Pa. Leader questioned what the VS 75E includes. "I'd like to know what I'm getting for $7,000 more," he said, noting that the 32-user serial controller cited by Wang has insufficient differentiation to interest him.

Leader and Neil O'Brien, director of technical support for Mony Financial Services' agency network in Syracuse, N.Y., were unaware the VS 65 would be replaced.

O'Brien observed that the VS 5, VS 6 and their successors are suited only for limited use. "I would say the 5E and 6E are probably not for us. Anyone putting on the maximum number of users and making use of more than one of Wang's incremental software products probably needs at least a VS 65 to drive it," he said. He called the VS 65 a good middle ground for Wang users and said confidence in Wang is high. "Personally, I feel much better about Wang. I think they are past bottoming out and on the way up," O'Brien said of statements made by Bob Ano, Wang's senior vice-president of corporate marketing.

A Wang value-added reseller said the VS 5E and 6E should overcome at least one handicap. "The initial release of those models involved a whole lot more processor than you could get at because of the drive strategy," said Dale Powell, director of Cansys Office Automation, Ltd. in Don Mills, Ontario.

Leader said his organization uses several VS 6 systems for office automation and that he is waiting to receive a VS 5E on a trial basis.

JAMES CONNOLLY

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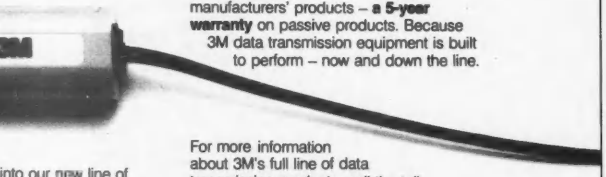

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	Los Angeles	Oct 15, Oct 29, Nov 12, Dec 8
	Newport Beach	Oct 6, Dec 15
	Sacramento	Oct 15, Dec 10
	San Diego	Oct 8, Dec 17
	San Francisco	Oct 14, Nov 17 Dec 15
	San Jose	Oct 7, Nov 5, Dec 3
CO	Denver	Oct 15, Nov 12, Dec 15
CT	Hartford (Farm.)	Nov 3, Dec 8
	New Haven	Oct 14, Nov 12
DE	Wilmington	Oct 1
FL	Ft. Lauderdale	Nov 5
	Orlando	Nov 4
GA	Atlanta	Nov 11
	Augusta	Dec 9
IA	Des Moines	Nov 17
ID	Boise	Nov 19
IL	Chicago	Oct 15, Nov 18, Dec 15
	Springfield	Nov 19
IN	Indianapolis	Oct 20, Nov 24, Dec 17
KS	Wichita	Oct 6
LA	Baton Rouge	Oct 22
	New Orleans	Oct 23
MA	Boston	Oct 20, Nov 10, Dec 15
	Burlington	Dec 2
	Springfield	Nov 17
	Worchester	Nov 5
MD	Annapolis	Oct 27
	Baltimore	Oct 8, Dec 17
	Bethesda	Oct 6, Oct 27, Nov 24, Dec 15
ME	Portland	Oct 8
MI	Detroit	Oct 13, Nov 12
	Grand Rapids	Nov 4
	Traverse City	Oct 28
MN	Minneapolis	Oct 29, Nov 18, Dec 10
MO	Kansas City	Nov 10
	St. Louis	Oct 13, Nov 10, Dec 9
NC	Charlotte	Dec 8
	Raleigh	Dec 15
	Winston-Salem	Oct 7
NE	Omaha	Dec 8
NH	Manchester	Oct 21
NJ	Cherry Hill	Oct 29
	Iselin	Oct 8, Nov 5, Dec 3
	Princeton	Oct 14, Nov 12, Dec 9
NM	Albuquerque	Nov 5
NV	Las Vegas	Oct 27
NY	Albany	Oct 6, Nov 4
	Buffalo	Dec 3
	Long Island	Oct 15, Nov 12
	New York City	Oct 7, Oct 21, Nov 4, Nov 10, Dec 2, Dec 17
	Rochester	Oct 22, Nov 18, Dec 17
	Syracuse	Oct 15
OH	Cincinnati	Oct 1, Dec 9
	Cleveland	Oct 15, Nov 12
	Columbus	Dec 8
	Dayton	Oct 20, Nov 17
OK	Oklahoma City	Nov 17
	Tulsa	Oct 20, Dec 8
OR	Portland	Oct 6, Dec 10
PA	Harrisburg	Oct 22, Dec 10
	Philadelphia	Nov 5, Dec 10
	Pittsburgh	Oct 20, Nov 4, Dec 8
SC	Greenville	Oct 14
TN	Knoxville	Nov 4
	Memphis	Oct 14, Dec 10
	Nashville	Oct 21
TX	Amarillo	Oct 13
	Austin	Oct 9
	Dallas	Oct 6, Nov 4, Dec 9
	Houston	Oct 16, Nov 18, Dec 10
	San Antonio	Oct 8
UT	Salt Lake City	Oct 29, Dec 10
VA	Richmond	Nov 17
	Virginia Beach	Oct 15
WA	Seattle	Oct 15, Nov 10, Dec 8
WI	Madison	Nov 12
	Milwaukee	Oct 14, Dec 3

CANADIAN SEMINARS

Calgary	Nov 18
Edmonton	Dec 1
Hamilton	Oct 20, Dec 15
London	Nov 17
Ottawa	Oct 1, Nov 5, Dec 3
Regina	Oct 27
Saskatoon	Nov 3
Toronto	Oct 13, Nov 10, Dec 8
Vancouver	Nov 12
Victoria	Dec 8
Winnipeg	Nov 24

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DEC throws hat in telecom ring with PBX plans

BY ELISABETH HORWITT
CW STAFF

GENEVA — Digital Equipment Corp. made its long-awaited debut in the telecommunications arena last week, announcing agreements with private branch exchange (PBX) manufacturers to jointly develop software applications and tools that integrate its VAX with PBX functions.

DEC chose the international Telecom '87 conference held here to introduce its Computer-Integrated Telephony (CIT) program, a "statement of direction that involves cooperative working relations with a multitude of switch providers here and abroad," said Gail Daniels, local-area network/voice marketing manager for DEC.

The purpose of the program is to allow users to access the PBX's connectivity features through the VAX or use the PBX to access VAX data, Daniels explained.

Not committed to single PBX

Applications developed through the program's protocols will be portable across all participating PBX systems, according to Daniels. "DEC has made a commitment not to make, buy or sell any one PBX," Daniels noted.

The company is working to implement CIT-based products and services with L. M. Ericsson in Sweden, Philips Telecommunications N.V. and Data Systems in the Netherlands, Plessey Business Systems in the UK and Siemens AG in West Germany, DEC said.

Initial CIT applications, which were demonstrated at the conference, center on the concept of a VAX-based message center, DEC said. For example, the user could send a message generated by DEC's All-In-1 package via a PBX, call up a corporate directory housed on the VAX or automatically identify callers and then access their profiles from a VAX data base.

"Digital is taking the right approach to the PBX market," commented Doane Perry, a consultant at International Data Corp. "This allows them to play the field and port their applications across a variety of devices, as opposed to acquiring a PBX company and being locked into its installed base," as in the case of IBM's acquisition of Rolm Corp. approximately three years ago.

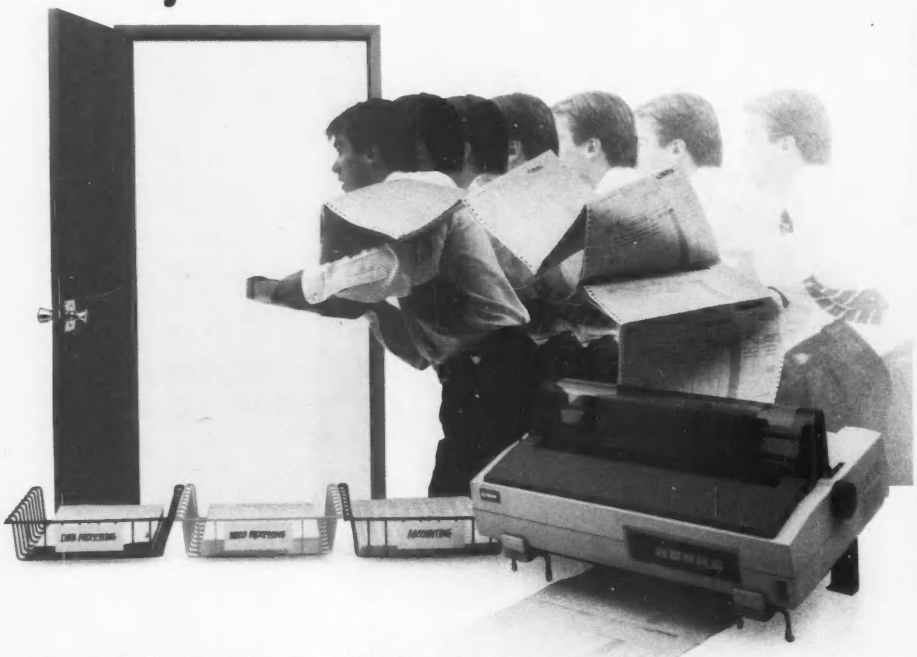
The new PBX connections will also provide DEC with new applications for its voice synthesis and voice response systems, Perry said.

However, Audrey Mandella, research director for the London branch of Boston-based research firm The Yankee Group, expressed disappointment that DEC "couldn't give applications beyond telemarketing" and that the announcement did not include DEC solutions for troubleshooting and controlling telecommunications equipment.

DEC has indicated that such offerings are forthcoming but has given no time frame for introductions.

The C-815 Supra 24-pin printer

My life in the fast lane



I used to spend a lot of my time waiting for our old printer to finish cranking out the paperwork for our busy corporation.

But since we bought the C-815 Supra from C. Itoh Digital Products, I never have a moment to spare. I'm living life in the fast lane.

Multi-applications solution

Our department managers love the C-815 Supra. It's like having two printers in one. It prints high volume data processing output, like invoices and spreadsheets, at speeds up to 570 characters per second (cps). And for word processing, the Supra prints sharp, clear, high-speed letter quality at 162 cps.

What really sold our DP/MIS management on the Supra was *Byte Magazine* and *Infoworld* listing the C-815 as the fastest 24-wire printer in their independent tests. And they were right. The Supra's speed and versatility increased our productivity.

Forms expert

Our executives are really impressed with the Supra's dependable, rugged paper handling. It manages continuous forms, labels, letterhead and up to 6-part invoices with its rear or bottom feed paper paths. In addition to its standard pull tractor, the C-815 also features a single-bin automatic sheet feeder that's upgradable to dual bin.

Whether it's high volume spreadsheets and multi-part invoices or letter quality business letters and presentations, the Supra is fast and reliable.

Sound investment

The finance department says the Supra is a great investment since C. Itoh has a long-standing reputation for high quality, durable printers. And because it has built-in emulations for the IBM ProPrinter XL,™ Toshiba P351™ and Qume Sprint 11,™ we don't have to invest in any new systems or software. It works with our new IBM PS/2™ family and such popular software packages as Lotus 1-2-3,™ WordPerfect™ and Chartmaster.™

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Board upgrades PC, PC XT to 386

BY ED SCANNELL
CW STAFF

HILLSBORO, Ore. — Intel Corp.'s Personal Computer Enhancement Operation (PCEO) announced an add-in board last week that upgrades users' existing IBM Personal Computers and PC XTs to Intel 80386-based systems.

Besides a 16-MHz 386 processor, the 386/PC is equipped with 1M byte of 32-bit memory and features switchless installation and two software utilities. Intel claimed the product lets PCs, XTs and compatibles run up to 10 times faster and the PC AT to run up to two times faster.

In tests conducted by Intel, an XT with the 386/PC board recalculated a 3,600-cell Lotus Development Corp. 1-2-3 spreadsheet in four seconds, a process that took 23 seconds without the board.

The company said the 386/PC will significantly increase the life span of existing systems. For instance, the product provides existing PC and XT users with enough speed and power to run IBM and Microsoft Corp.'s OS/2 operating system, according to Rich Bader, general comanager of Intel's PCEO.

Bader said he believes the product's speed and power — as well as its $995 price tag — will appeal strongly to existing users. "At $995, it is an attractive buy for most corporate users," Bader said.

Intel also said it has made its original Inboard product, the Inboard 386, compatible with the Lotus/Intel/Microsoft Expanded Memory Specification 4.0.

Intel reduced the price of the Inboard 386 with no installed memory but with an installation kit from $1,995 to $1,595 and cut the price of the version with 1M byte of memory and an installation kit from $2,495 to $1,895.

The 386/PC can accept the vendor's optional 2M-byte Piggyback Memory Board, giving the system a total of 3M bytes of memory. The optional board with 1M byte of memory costs $645. It costs $1,145 with 2M bytes of memory.

The Inboard 386/PC is scheduled to be available in January.

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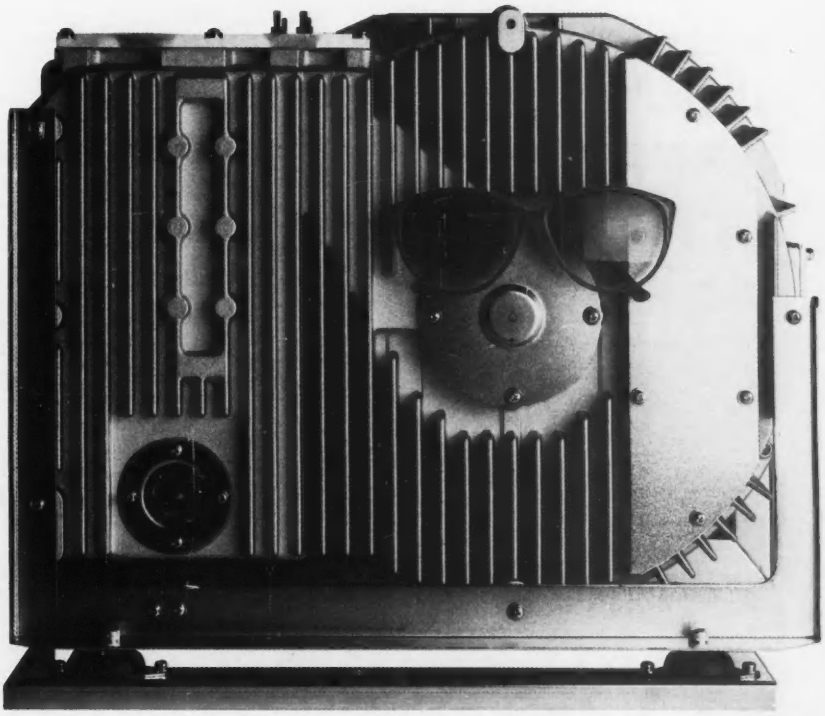

"And I'm a lot more reliable as a result."

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Deal will merge Unix with SunOS

BY STANLEY GIBSON
CW STAFF

AT&T and Sun Microsystems, Inc. announced last week that they will cooperate to create a Unix-based reduced instruction set computer (RISC) architecture. Products making full use of the fruits of the joint effort, however, will be some two years away, both firms said.

AT&T agreed to license Sun's Scalable Processor Architecture (Sparc) and said it will merge its Unix System V, the University of California at Berkeley's Unix 4.2 and Sun's Berkeley-based SunOS operating system [CW, Oct. 19].

"We believe the computing platform has the potential to change the industry in the years to come," said Vittorio Cassoni, president of AT&T's Data Systems Group. Throwing AT&T's weight behind the proposed standard, Cassoni said AT&T's 3B2 line of minicomputers will migrate to the platform.

"Eventually, the 3B2 line will be all RISC-based," Cassoni said. Applications currently written for the 3B2 will be portable to a new Sparc Unix platform, he said. Nonetheless, AT&T will continue to manufacture, market and enhance the 32100 and 32200 microprocessors. The 3B2 currently uses the 32100.

Three months ago, Sun implemented Sparc in its Sun-4/200 workstation, which the company claimed can perform 10 million instructions per second. Fujitsu Microelectronics, Inc. makes the Sparc-based chips used in the workstation.

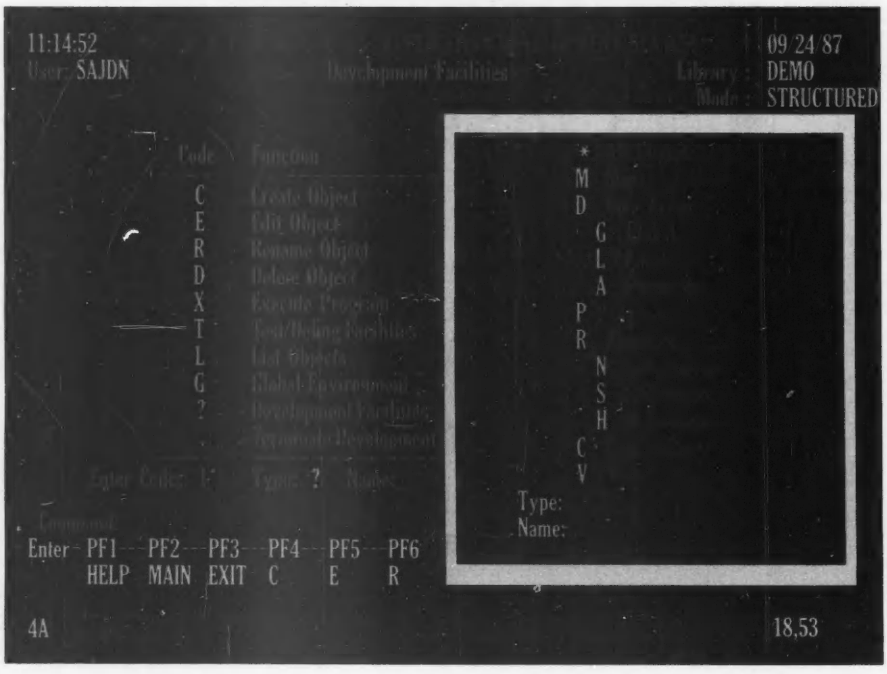
Arete to use standard

Arete Systems Corp. announced that it will use the Sparc Unix standard in a line of superminicomputers it plans to introduce in late 1988.

AT&T's part of the bargain is scheduled to be implemented in stages, starting with a series of seminars in the first quarter of 1988 designed to educate interested parties in the architecture. Later in 1988, SunOS reportedly will be merged with Unix System V, and in the first half of 1989, the fully enhanced Unix version should be available under license from AT&T.

One software developer welcomed the announcement. "The fewer the architectures, the better, from a software developer's point of view," said Jit Saxena, president of Applix, Inc., a developer of Unix-based office automation software in Westboro, Mass.

NATURAL 2. Maximum functionality for multiple environments.



Good news for DB2 users: beginning this January, NATURAL 2, Software AG's fourth generation application development technology, will support DB2 and SQL-DS data bases.

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software AG
PROGRAMMING BUSINESS SUCCESS

Tandem eyes optical disk

NEW ORLEANS — Tandem Computers, Inc. introduced an optical disk archival storage and retrieval system last week for use with its family of transaction processing systems.

Introduced at Tandem's international users group meeting here, the 5200 optical storage facility represents Tandem's first embrace of write-once read-many optical storage technology. The system uses a jukebox mechanism containing up to 32 2.6G-byte cartridges to offer more than 83G bytes of storage capacity. Tandem is purchasing the optical storage subsystem from Hitachi Ltd. and has incorporated its own very large-scale integration controller for attachment to its EXT10, EXT25, Nonstop II, TXP and VLX systems.

The optical subsystem is aimed at organizations that require large amounts of archival data that is readily accessible online from the host, according to Derek Ginger, product manager of storage products.

"One of our beta-test sites — a medical testing firm — is replacing its microfiche system with the 5200," Ginger said. Tandem expects to begin shipping the 5200 Nov. 30. The subsystem lists for $155,000, including controller, jukebox, two optical disk drives, two cartridges and cable.

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The Gandalf Hybrid, one of a series.

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AST PC a breakthrough?

BY JAMES A. MARTIN
CW STAFF

ANALYSIS

NEW YORK — AST Research, Inc.'s new microcomputer based on the Intel Corp. 80386 chip may be the breakthrough product the Irvine, Calif.-based board maker needs to make a big push into the crowded systems market, users and analysts said last week.

AST's follow-up to its Premium/286 is "a bigger step forward than anything we've seen from compatible vendors so far," according to William F. Zachmann, vice-president of corporate research at International Data Corp. in Framingham, Mass.

Zachmann said the AST system could impact IBM's attempt to forge a new standard with the Personal System/2 and "could also give Compaq a run for their money." Compaq Computer Corp. recently announced a 386-based microcomputer with its own high-speed bus.

The Premium/386, unveiled at a press conference last week, is attracting interest for its hybrid approach to the "New Coke-Classic Coke" syndrome some users have experienced since IBM announced the PS/2 line and began phasing out the Personal Computer series.

The four Premium/386 models include AST's proprietary Smartslot architecture, an enhanced PC AT bus structure with the multiple processing capabilities of the PS/2 Micro Channel bus. According to AST, Smartslot will accommodate add-in cards designed for either the PS/2 or the PC series.

Imitate, don't litigate

Most importantly, observers said, AST has designed a system that bridges the gap between the PC and the PS/2's most important feature, the multiple-bus arbitration scheme of the Micro Channel. In addition, according to AST, the Smartslot bus mimicks the Micro Channel without copying it — a necessary precaution against possible litigation from Big Blue.

AST's Smartslot architecture is "a bold, forward-thinking move," said Tim Bajarin, executive vice-president of Creative Strategies, Inc., a Santa Clara, Calif., consulting firm. "The trick is to find a way to match IBM's power and performance without having to clone them, and it looks like AST has found an interesting way to do that," he said.

AST claims to be shipping some 12,000 units per month of its Premium/286, with a total of 50,000 sold to date. But it is still only one of dozens of companies competing not only with the AT and compatibles but with several PS/2 models.

In addition, some analysts believe an increasing choice of proprietary bus structures could inadvertently drive users closer to IBM.

"The more alternatives there are, the more people will go with IBM," said Esther Dyson, president of Edventure Holdings here. "The biggest good news for IBM is when someone clones their products. It proves that the product is indeed a standard."

The Smartslot bus is consistent with AST's emphasis on enhancing current standards, according to Richard Tobias, director of technical support for Damon Corp., a medical research lab in Needham, Mass. "They have always brought forward new technology and left the old technology with you in case you needed it," Tobias said. With 20 to 30 Premium/286s in place, Tobias said, Damon will consider the Premium/386 first when upgrading.

Some observers said the Compaq and AST introductions portend a trend in proprietary, yet compatible, micro bus structures.

"Until someone puts a Western Digital Corp. or Chips & Technologies, Inc. chip set into a box that actually clones the PS/2, this will be the way to go," said Richard Shaffer, editor and publisher of the "Computer Letter" in New York.

Several users said they like the migration path AST has offered with the Premium/386's ability to run Micro Channel and traditional PC add-in cards as well as the company's 386 processor board for upgrading the Premium/286.

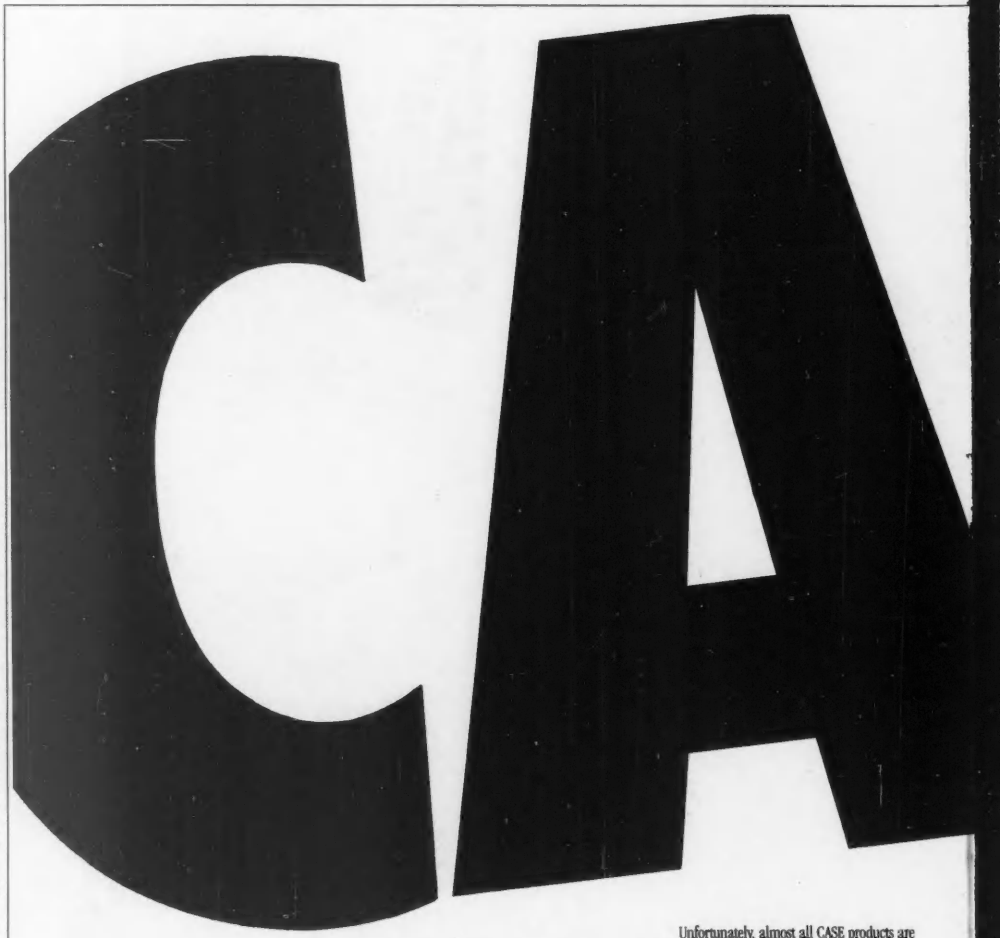
"The key thing is being able to use the old bus with a higher performance and without having to wait around for all of the pieces of OS/2 to fall together," said Kingsley G. Mar, assistant vice-president, research and development at Wells Fargo & Co.'s commercial banking division in San Francisco, which has some 100 Premium/286s.

Premium/386

NEW YORK — The Premium/386, announced here last week by AST Research, Inc., is said to be compatible with the IBM Personal Computer AT while offering multiple processing capabilities similar to those found in IBM's Micro Channel architecture-based Personal System/2 models.

In addition to the Premium/386, based on the Intel Corp. 80386 chip, AST announced an Intel 80286-based AT-compatible workstation and Fastboard/386, an enhancement card to upgrade the Premium/286 to a 386.

The Premium/386's Smartslot architecture, as AST has dubbed it, consists of



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said to meld best of AT, PS/2 worlds

three components: a dedicated 32-bit path between processor and random-access memory (RAM), a feature bus and a multimaster bus arbitration scheme. All four Premium/386 models are expandable to 13M bytes of RAM and offer seven expansion slots. A 1.2M-byte 5¼-in. floppy disk drive is standard on all models.

The Models 300 and 340 are equipped with 1M byte of 32-bit static-column RAM. The Model 300 retails for $4,695, and the Model 340, with a 40M-byte hard disk drive, sells for $5,695.

The Premium/386 Model 390 features a 90M-byte hard disk and 2M bytes of RAM for $7,695, while the Model 3150 offers a 150M-byte hard disk and 2M bytes of RAM for $8,995.

All models are set to be shipped in January.

The AST Premium Workstation features a 1½-sq-ft size, selectable speeds of 6 and 10MHz, 1M byte of RAM, two 8- and 16-bit full-expansion slots and support for the Intel 80287 coprocessor.

Five flavors

The workstation will reportedly be available in January in five configurations: diskless for $1,995; 3½-in. 1.44M-byte or 5¼-in. 1.2M-byte floppy-disk versions for $2,295; and 40M-byte hard-disk versions with either floppy format for $3,295.

The Fastboard/386 enhancement board announced last week for the Premium/286 features a 16-MHZ 80386 microprocessor, 1M byte of 32-bit wide RAM, upgradable to 4M bytes using a piggyback daughter board or 8M bytes using 1M-bit dynamic RAM chips.

With a cache memory of 64K bytes and 80387 and 80287 coprocessor support, the ability for externally toggling between 286- and 386-based processors and support for the Lotus/Intel/Microsoft Expanded Memory Specification 4.0, the Fastboard is set to be available in late January at $1,995 for a 1M-byte and $1,995 for a 4M-byte RAM expansion board.

JAMES A. MARTIN

Nomad finds home, revamps

BY ALAN ALPER
CW STAFF

NEW ORLEANS — Must Software International, the company formed by Thomson SA of France to market its recently acquired Nomad line of application development tools, last week revealed plans for enhancements and improved support of both the mainframe and microcomputer versions of the product.

Among the enhancements expected in Release 4.5 of Nomad2, the mainframe version of the fourth-generation language and data base management system, are support for referential integrity and increased efficiencies in handing SQL statements off to the data base processor. PC Nomad Release 2.0 will offer a cooperative processing facility that automatically links data bases on the micro, mini and mainframe and lets changes made on the micro be updated on the other two, the Wilton, Conn., firm said.

At the fourth annual Nomad users conference, which was held here and drew almost 600 attendees, Must also demonstrated a version of Nomad for Digital Equipment Corp. VAX/VMS computers. Nomad VAX, which is expected to ship shortly after the new releases of Nomad2 and PC Nomad hit the street in February, is aimed at filling the product line's void in the mid-range of the three-tier computing environment emerging at many firms.

Triple threats required

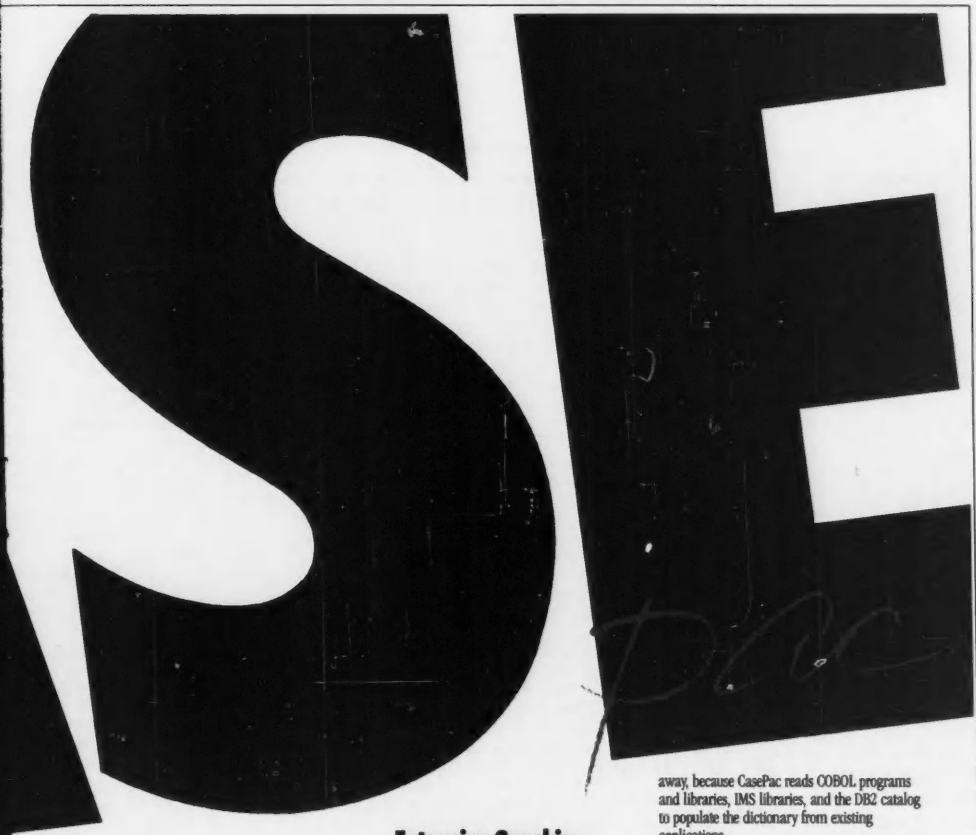
"People want a product than runs across IBM mainframes, PCs and VAXs," noted Frank Fish, Must's executive vice-president. "A lot of companies' policies say they won't buy a product unless it runs on all three."

A volume-oriented, graduated pricing scheme for Nomad products leased for use with various models of the IBM 9370 was also announced at the conference. As an added incentive to PC Nomad users, Must is charging $100 to upgrade to the release; customers will receive two copies for each unit licensed.

Among the other enhancements in Release 4.5 of Nomad2 are support for procedural windows, which extends the product's windowing facility to end users; a session manager to allow users running IBM's MVS to eliminate much of the overhead of TSO for production applications; and a resource-tracing facility. The new release of PC Nomad 2.0 will also feature a facility to allow casual users to pick and point through menus while creating a report from the data base, the company said.

Most Nomad users voiced their approval of the enhancements throughout the four-day conference. Many said that Must is doing a much better job than Nomad's former parent, The Dun & Bradstreet Co.'s D&B Computing Services subsidiary, in articulating a coherent technology strategy.

"The new parent seems to have a strategic commitment to the product, unlike D&B," said Phil Bulled, data resource manager at British Columbia Systems Corp., a Canadian data processing services vendor, echoing the sentiments of most Nomad users.



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EDITORIAL

Pointing fingers

Computer systems held up surprisingly well during the unprecedented stock trading volumes of last week. But the computer's reputation may be unfairly besmirched as the financial establishment goes about pinning down a scapegoat for the wild gyrations in the stock market.

The only major reported problems in the automation of the market came with the lengthy delays in the stock ticker. But systems at various trading exchanges and major brokerages were able to deal with the record-setting pace of more than 600 million shares traded last Monday and Tuesday, according to available accounts.

But some critics claim that computers are doing the job too well. Already, outraged congressmen are pointing the finger of blame at the now-famous practice of "programmed trading" — whereby preset indicators result in computers issuing massive buy-and-sell orders to gain profit based on actual stock prices and the cost indexes pegged to predictions of future stock prices. Technology is the ideal and readily available scapegoat that avoids the human issues of greed and inadequate regulation.

Before the process goes too far, it would be wise to remember that computers are but a tool. They merely speed up the ability of humans to take advantage of existing opportunities.

OK on security

The decision by the National Bureau of Standards to support the Data Encryption Standard for five more years is good news — and not just for the banking and federal MIS operations that use it the most.

Encryption is increasingly catching on in the commercial market as companies seek to expand their operations globally. By mounting a campaign last year to harpoon DES in favor of a much more restricted algorithm, the National Security Agency let nationalistic fervor get in the way of practical policy. The alternative that NSA proposed not only would have made it more difficult to obtain encryption products but would also have severely limited the use of the algorithm outside the U.S.

Fortunately, an overwhelming response by users and computer vendors convinced the standards body that DES is a sound security mechanism. No one has proved that the 10-year-old DES algorithm has ever been compromised or could be broken with anything less than a massive commitment of supercomputer resources. What's more, the algorithm provides an effective authentication mechanism.

In supporting DES, the NBS has given user organizations the OK to proceed with their security plans without worrying about bureaucratic second thoughts.

LETTERS TO THE EDITOR

What's in a name?

IBM has taken aggressive actions in legally protecting its Personal System patents and trademarks. Among these actions, IBM seeks to restrain competitors from using advertisements that reference IBM's trademarks. The trademarks in question include the names "Personal System," "PS/2" and even "/2."

Some years ago, Scott Paper Co. trademarked the acronym "P.S." This PS stands for Personal Seat, the toilet seat covers distributed in public restrooms.

Since IBM has now trademarked "PS/2," have they not usurped Scott's ability to use this name for a new, enhanced version of its Personal Seat?

George Polichar
Los Angeles, Calif.

Not fully accurate

Theodore Willoughby's letter to the editor [CW, Aug. 17] was unfair to Jack Bologna. The letter suggested that Willoughby needed to study the Equity Funding case with more care. Willoughby might find it useful to study the report of Robert Loeffler, the trustee in Equity Funding's bankruptcy proceeding, and a Dec. 17, 1975 deposition by Robert Suttle of Peat, Marwick Main & Co. The two documents are reproduced in *The Equity Funding Papers.*

Loeffler's report explained how examinations of Equity Funding operations by various state insurance commission representatives were rigged by the Equity conspirators. These examinations, in effect, were independent audits. Suttle explained how an actual independent audit was frustrated by this same Equity Funding group.

Willoughby's letter suggested that he places unreasonable reliance on the methods used by auditors in what he termed account verifications. These techniques locate, at best, relatively minor accounting errors. The procedures followed by themselves cannot be relied on with any reasonable confidence to find fraud or embezzlement. It has been demonstrated that thieves will go to extreme lengths to compromise auditor confirmation exercises and avoid the detection of ongoing fraud.

Belden Menkus
Middleville, N.J.

Looks familiar

The article "Cray dumps massive processor plans" [CW, Sept. 7] concerning Cray Research, Inc.'s nixing Steve Chen's supercomputer project due to cost overruns and the use of nonproven risky methods, thus prompting Chen to subsequently resign, was most interesting.

I would like to point out that these were much the same reasons Control Data Corp. canceled Cray's 8600 project, which prompted Cray to resign and form Cray Research (the 8600 became the Cray-1). History seems to repeat itself.

Michael S. Smith
President
Opcode, Inc.
Austin, Texas

'Messing about'

Contrary to Milt Bryce's opinion, the editorial "CASE advantage" [CW, Sept. 7] contained no nonsense. Scientific advances and good software depend on "messing about," or prototyping, until a result is reached.

Once the electrons seem to move without resistance — or the user likes the screen — then the scientist uses the scientific method to prove the result, or the programmer works with a formal methodology.

If formal scientific methods had preceded any messing about, we still might not have the first transistor. Putting the rigor before the result does not work in software, either.

Martin L. Rinehart
Chairman
Wallsoft Systems, Inc.
New York

Supports proposal

The article "Opponents bemoan ANSI Fortran 8X additions" [CW, Aug. 10] was much too one-sided to show your readers what the proposed Fortran standard is likely to offer its current and future users.

I do not know what the author calls a cross section for purposes of technical analysis of a major document, but the individuals he quoted, with the exception of the one from Boeing Computer Services, were all representatives of computer manufacturers and opponents of the current Fortran 8X standard document. In addition, the comparison with the Cobol 85 standards' lack of compatibility with previous Cobol versions led readers to the conclusion that a similar problem exists with Fortran 8X — when in

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Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

CD-ROM: Search for tomorrow

Evaluating the educational and business implications of the medium

RUSSELL LIPTON

You know the story by heart. First comes the chicken. No, first comes the egg. No, first comes the hardware . . . no, the software.

Compact-disk/read-only memory (CD-ROM) technology is the latest example of the chicken-egg conundrum. This technology makes it possible to put truly fantastic quantities of data at your disposal.

Even more tantalizing, second-generation CD-ROM technology will be writable as well as interactive, enabling you to mix text, audio and video on the same medium. You say that you want less, not more, data at your side? Then you'll be relieved to hear that CD-ROM is currently expensive and terribly slow. And remarkably enough, even with gigabytes to play with, the voracious bit demands of image and voice will combine to limit the scope of applications for years.

PAUL MEISEL

While it's a safe bet that CD-ROM players (both the machines and the companies) will sail through unusually turbulent waters, it is an equally safe bet that CD-ROM or its descendants will be taken for granted within 10 years, maybe five.

However, is CD-ROM the chicken or the egg? Will the existence of CD-ROM players provoke relevant software applications? Or will software applications — and what kind? — drive the hardware?

Ironically, it is an easy and almost irrelevant task to place an encyclopedia (or 10) in CD-ROM technology. Easy because the text can essentially be stored as is. Irrelevant because unless users are provided with friendly navigation tools through the information, they will give up in disgust in five minutes. Make that two minutes.

The very capaciousness of the potential storage poses extreme problems for data suppliers. The basic problem is: How do we find what we're looking for when we're looking for information needles in a 500M-byte-plus haystack?

If you've ever searched for relevant information in a 5M-byte data base, you'll understand immediately. Existing query and access methods just aren't going to make it. What is needed is an interface advance as far beyond, say, Apple Computer, Inc.'s Macintosh as the Mac was beyond early personal computers.

Furthermore, it may turn out that CD-ROM data bases favor the old-fashioned hierarchical and networked models. Think about it. Which is easier for the user-reader, to track down a carefully structured tree of information, moving up and down and, if need be, laterally across a network? Or to navigate across flat, undifferentiated data structures? Please note the "reader." It is one thing to control referential integrity in a data base that drives an accounting application and quite another to browse through an encyclopedia.

Other software problems abound. Have you ever performed a key-word search through a CD-ROM data base? True, key-word searches will turn up every instance of 'X' word. However, the reader is often left with endless instances of words that turn out not to be key at all to understanding or tracing a concept through the data base. Here, natural language queries do show some promise.

Unfortunately, it is difficult with natural languages to be sure the question was phrased properly. We'll get the information back, all right, complete with doubts about its softness. Did our question retrieve the needed type of information? Did it retrieve all of it? We may never know. One virtue of programming and query languages is that their very precision helps establish confidence in their results.

Good old paper

Finally, it remains to be seen whether users will ever do significant amounts of "reading" on their information appliances. I am inclined to believe that we will yet see versions of Alan Kay's Dynabook within the next 10 years: extremely portable, tiny boxes that provide crystal-clear resolution, coupled with new types of user interfaces and navigation systems. Still, while we may not like to admit it,for visual ease, good old paper will always beat hands-down even a truly readable CRT.

Enough of the down side. The up side is that the rigid, linear constraints of paper media will be largely obliterated with CD-ROM. The implications for education and training are staggering. It will finally be possible to pursue individualized learning pathways that mix a host of presentation media. Where educators today write texts, in the future they will write navigation scripts. We will not buy linear collections of book facts so much as an author's view of the data.

The same data will be accessed by multiple navigation systems prepared by different writers. Here, we can discern a natural tie-in to the progress being made in rule-based expert systems, with their clean separation of facts and the rules that operate upon those facts.

Today's simulation games offer a taste of the coming embrace between education and entertainment. By now, we know new technology hardly guarantees good education. Still, why shouldn't a high school student experience the same excitement in exploring a mathematics simulation on CD-ROM that he does with a computer adventure

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Lipton is vice-president of IBP, Inc. and publisher of a technical journal on the fourth-generation language, Focus. He is also currently preparing a book for publication.

Management styles: Japan vs. the U.S.

A comparison of information center leadership methods goes beyond mere cultural differences

CHARLES P. LECHT

The problems faced by information center leadership in the U.S. and Japan are as different as night and day when viewed from a personnel management standpoint. The differences in technology, though not trivial, also pale by comparison.

Japanese information center leadership has an advantage in personnel management that sets it far ahead of its foreign counterparts. Put mildly, it doesn't need to force a staff to act as a group with a common goal. In coordinating the efforts of people with diverse technical skills and backgrounds, nothing is more important than selfless cooperation for the achievement of a common goal.

Americans with little or no exposure to Japan and Japanese computer facilities have the image of a robotized Japanese staff that aids and abets such cooperation. How else can Americans explain the existence of their own often discordant and strife-ridden environments? We are told that the single-minded goal dedication we witness in Japanese information centers is nothing more than witless obedience inhibitive of creativity.

Telling time

In some U.S. corporations, the very idea of "cooperation without competitive conflict" seems to be viewed as a condition to be avoided at all costs. The nonsense with which management must deal in the name of democratic discourse boggles the mind. If there is a time for dissent and a time for cooperation in any computer center, as I see it, Japanese information center staff can tell time better than their U.S. counterparts.

However, the group harmony factor is only necessary — not sufficient — to make things work well. In many Japanese information centers, especially those with larger hardware, it masks other difficulties — particularly the technological skill levels of staff — that may not be so apparent to the visitor.

The capabilities of the Japanese information center manager to get his work done have thus far been severely crippled, the foremost being his staff's need to deal with a techno-economic environment that is documented in at least two languages — Japanese and English.

While this dual-language problem exists elsewhere, it is especially acute in Japan because the two languages are about as different as languages can be. Despite the fact that English is a requirement in Japanese schools, few people become proficient enough to be able to read a textbook or newspaper article without great difficulty.

Because of historic and economic reasons, computer science is an English-language-based phenomenon for Japanese people. All the manuals for the earliest systems in Japan were documented first in English by foreigners, then translated — often very poorly.

> IN SOME U.S. corporations, the very idea of "cooperation without competitive conflict" seems to be viewed as a condition to be avoided at all costs.

Japanese translation of the massive volumes of English-language textbooks and magazine articles that flowed from the English-speaking world in the 1960s and '70s could hardly take place. The current generation of Japanese computer users who are unable to read or write English fluently cannot develop their usage skills as fast as their U.S. compatriots.

The result cannot be underestimated in its negative impact on the information center manager in Japan. Its magnitude vitiates the positive benefits obtained from group harmony.

What good is it if everyone is getting along just fine, but the job isn't getting done? In my 18 years of dealing with Japanese companies, I've always been surprised by the number of people it takes to accomplish the same job done by far fewer Americans — and with no less patient an upper management wishing to see it done.

There is little doubt that, on balance, U.S. data processing managers have a far wider variety of choices in how they may approach, enact and implement their corporate applications.

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Lecht is an IDG News Service foreign correspondent based in Tokyo.

CD-ROM

CONTINUED FROM PAGE 21

game? The adventure construction sets that accompany some of these products will certainly appear in the CD-ROM market in the guise of navigation construction sets that will let reader-users construct their own pathways through data and share those pathways with others.

Funny, I haven't mentioned the business user, have I? It seems like I've been talking about the infamous home market. Won't companies evolve their own highly complex networks of shared information, just as today they evolve similar networks of financial and accounting data?

Lotus Development Corp. and Microsoft Corp., no small players, certainly think so. CD-ROM applications for business are high on the strategic list for both. To start with, consider the tangled process of managing a project proposal through the corporate maze of attached reports, presentations, memos and spreadsheets. This technology will make it feasible to manage and modify the accumulating information and enable executives to flexibly brief themselves along the precise pathway of their needs.

Buying myths

The key to the promise of CD-ROM is that it is a writer-reader-viewer technology. If (and it's a big if) vendors can find a way to produce flexible and logically coherent paper printouts of any desired material, business applications will appear in abundance. The fact is, no one is going to buy the myth of the paperless office again. Printing on demand plus the appearance of fourth-generation monitors (beyond video graphics arrays and its children) should turn the trick.

Of course, that's all for tomorrow. But today, an interesting group of real products is beginning to appear that will form the basis of the navigation tools I have been describing. The most relevant are the so-called hypertext products. Owl International, Inc.'s Guide was first on the scene, but Apple's Hypercard is bidding to steal the show. These and other products make it possible to evaluate some of the implications of CD-ROM technology even before purchasing a CD-ROM player.

Cultures

CONTINUED FROM PAGE 21

They are far freer to break the rules and experiment than their Japanese colleagues, who seem to many Americans to be burdened by an archaic tradition that recognizes length of service and age instead of talent.

One would think this situation would foster greater happiness and contentment for U.S. information center management and staff, but this does not appear to be the case. To consign the question merely to cultural differences begs the issue.

The young in both countries cannot help but witness how their elders are treated after reaching management posts. Observing their ruthless removal by some underling cannot foster much company loyalty in the young who may otherwise have been inclined to be single-company career-minded. Around computer centers, there are great efficiencies to be gained by lack of turnover in bright staff, but it is precisely those people who leave first when a corporate "execution" of an elder is witnessed.

The employee stability enjoyed by Japanese information center management is often explained by foreign observers as being rooted in blind obedience fostered by a cultural demagoguery. But the bottom line may well be consciousness of the kind of treatment they will receive in the twilight of their careers.

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fact it does not.

The public will have adequate opportunity to comment on the merits and shortcomings of the current document during the mandated public review period that will start shortly. The X3J3 Committee is obligated to respond to the public's comments and fully expects to make changes to the current document as demanded by the reviewers.

Werner Schenk
Director of MIS
Data-Term
X3J3 Committee Member
Rochester, N.Y.

This week in history

Oct. 24, 1977
A Purdue University study finds that 92% of the employees of five major corporations would prefer to be consulted before their employers release personal information about them to outside organizations, while most say they really do not know how the data in their files is used.

Oct. 25, 1982
While a vast majority of the DP managers interviewed at the Data Processing Manager's Conference support Reaganomics, most do not believe economic recovery is "right around the corner," as the administration has claimed. Nearly all say their operations have been affected dramatically by the protracted recession and feel Reaganomics is the best way to imbue the economy with a sense of stability.

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SOFT TALK

Charles Babcock

Jimmying the VSE lock file

James A. Young, president of a start-up software company in Lincoln, Neb., called Jeyco, knows whereof he speaks. He is selling a product that attacks the lock-file bottleneck that occurs when contention builds up among multiple IBM VSE systems running under VM.

Young is also the former senior vice-president for information services at Central States Health & Life in Omaha, where two years ago, four VSE systems running as guests under VM experienced performance degradations during peak activity even though they had an IBM 3083 for their CPU.

Young claims it's not unusual for the CPU handling multiple VSE systems to be running at only 50% to 60% of capacity during peak periods because of the lock-file problem.

"I was forced into an MVS conversion because I could not get the performance out of VSE," he recounted earlier this month when contacted about his company's product.

When he sought advice from his IBM representative on what to do, he says he was told that you need "strong shoulders when you have a performance problem. You're going to have to convert to MVS."

This was not incorrect advice. It was inevitable that Central States Health & Life would

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Users on bundled AI: Show me

Cullinet, MSA predict built-in expert systems by '89, but some skeptical

BY ROSEMARY HAMILTON
CW STAFF

Four mainframe software houses are currently discussing making expert system technology available to their customers, and two of them — Cullinet Software, Inc. and Management Science America, Inc. (MSA) — claim they will provide applications with built-in expert systems by 1989.

The vendors' plans, however, have failed to generate keen interest among many users so far. Claiming there are few specifics being provided to them, users are concerned that the vendors' activity may not match their future needs.

John Landry

"I've heard so many different things about expert systems," said Joanne Dunleavy, system development manager at the Pepsico bottling group, which has installed several applications from McCormack & Dodge Corp. "What are they going to give me? If they can tell me that, I can tell them if I need it or not."

While vendors will likely add their own twists to this effort, a common goal has been expressed by the four companies: provide expert systems on top of existing applications to supply expertise when needed within an application.

The expert systems would likely serve the more ad hoc, interactive portions of an application rather than the compute-intensive aspects. In an example used by Cullinet's executive vice-president for application

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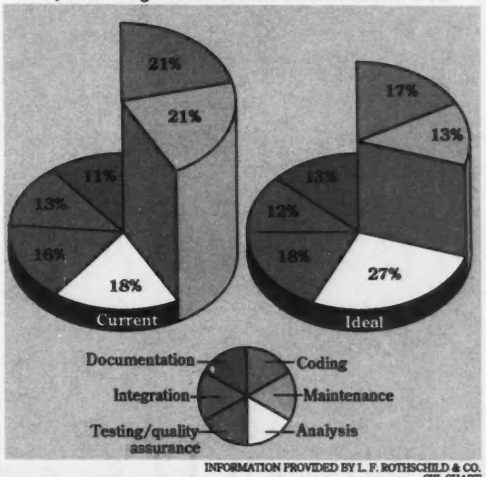
Data View

The ideal and the real

Survey of MIS developers shows they think less should be spent on software coding and maintenance and more on other areas



INFORMATION PROVIDED BY L. F. ROTHSCHILD & CO.
CW CHART

SOFTWARE NOTES

CTG to weld steel team

Computer Task Group, Inc. in Buffalo, N.Y., has undertaken its largest contract ever to produce systems for a joint venture of USX Corp. and Pohang Steel, Korea's largest steel producer.

For $25 million over a five-year period, Computer Task Group said it will convert USX from its unique, modified MVS to standard MVS and create a new production scheduling system and customer service and support system. The latter two are supposed to be up and running in 12 months, noted Chairman David Campbell.

The joint venture is USX's attempt to regain its competitive advantage as it imports raw Korean steel to a processing plant in California. Analysts at Donald-

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EMC tool doubles VM memory

HOPKINTON, Mass. — EMC Corp. began shipping a program this month that it said will boost the memory capacity of the IBM VM operating system from 16M to 32M bytes.

VM Extender, which must be purchased with EMC memory, is intended for users who want more memory but do not require the additional system-management features that come with IBM's VM/SP High-Performance Option.

The EMC program is a set of instructions that causes the VM operating system to recognize the additional memory. It carries an initial license fee of $5,000 and a subsequent monthly fee of $425.

Users can purchase either an additional 8M or 16M bytes of EMC memory for $30,000 per 8M-byte increment, EMC said.

The software was designed by VM/CMS Unlimited, Inc., a Boston-based software firm specializing in the VM operating system.

According to VM/CMS President Romney White, the software does not allow a user to directly address the additional memory. Instead, it employs a paging technique to access data stored above the 16M-byte line.

Inside

- Software, connectivity product vendors flood Info '87. Page 24.
- Cimpoint rolls out Factory Data Manager. Page 25.
- HP announces graphics-exchange specification translator. Page 34.

BIM Spotlight

Remote Printing at Low Cost!!!

BIMSPOOL retrieves print output from the **DOS/VSE POWER** spooling queue and prints it on a local or remote 3270 terminal printer via CICS. This provides RJE printing without its expensive equipment cost. (Often the 3270 printers are already in place, and lightly used.)

CRT functions are provided to display queues, manage print tasks, and to view output listings instead of or prior to printing.

Hundreds of users worldwide, since 1979. **BIM** 'wrote the book' on spooling to terminal printers from POWER queues.

Call for full documentation or **free 30 day trial.**

Price: $4000, $2000/yr, or $200/mo. BIMSPOOL is also included in several BIM product group offerings.

BIM has 15 system software products for improving productivity and use of DOS/VSE, OS, and CICS, and also performs systems programming consulting. Marketing agents in most countries.

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Software, connectivity tools steal the show at Info '87

BY ALAN J. RYAN
CW STAFF

NEW YORK — The Info '87 show included several announcements in the category that information managers said they came to see: software and connectivity products.

Lattice, Inc. announced its Lattice RPG-II Development System that is said to allow RPG-II programs to run on a personal computer. The system consists of Lattice's RPG-II Compiler, priced at $750; Source Entry Utility, which costs $250; Screen Design Aid, which sells for $350; and Sort/Merge Utility, priced at $250. Also announced were upgrades in the development system's components, including Version 2.0 of the Lattice RPG-II Compiler.

Also showing IBM mainframe software was Decision Technology, Inc. in Princeton, N.J., which announced the availability of On-Down, a component in its Decision Analyzer Series. On-Down reportedly allows users to format and transfer information from mainframe data files to popular personal computer software formats, such as Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Dbase III. The Decision Analyzer Series is designed for the IBM 9370. On-Down is priced by CPU, with entry license prices at $12,000. It reportedly will be generally available Nov. 1.

Unveilings

Other product rollouts included the following:

• Applied Innovation, Inc. in Columbus, Ohio, announced its AI Switch 180, which is used to connect and switch a large number of computer users or devices to a limited number of computer host ports. The way it works is said to be similar to the way a telephone private branch exchange (PBX) is used to connect and switch a large number of telephone users to a limited number of outside common-carrier lines.

The Series 180 typically works with any asynchronous port, including those on Digital Equipment Corp., Hewlett-Packard Co., Data General Corp. and Prime Computer, Inc. computers. It will also work with PCs that have asynchronous ports and with Unix-based computers. Prices range from $100 to $113 per port.

The Series 180 is used as a port selector, port contender and, optionally, as an CCITT X.25 packet assembler/disassembler to synchronous packet-switched networks. It is able to have two complete configurations stored in firmware for backup to a standby host or network, the vendor claimed. It reportedly will be available in quantity this month.

• Fischer International Systems Corp. in Naples, Fla., announced a link between its EMC2 Electronic Mail Communication Center and any device or system compatible with LU6.2 Document Interchange Architecture. The interface reportedly allows LU6.2-compatible devices — such as IBM's Displaywriter and Systems/34, 36 and 38 and device-compatible departmental systems from HP and Wang Laboratories, Inc. — to directly connect to the EMC2 data base and to have full EMC2 document processing capability. It is priced from $8,000 to $12,000.

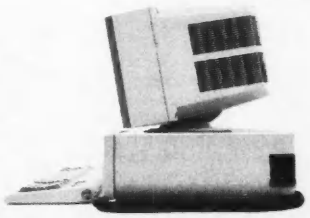
• Modem supplier Omnitel, Inc. in Fremont, Calif., unveiled a line of communications products that reportedly enable an IBM Personal Computer or compatible to act as a modem server for as many as 16 modems. The Netcomm Series includes the Netcomm V-Com, a half-size asynchronous virtual communications adapter that sells for $179; Netcomm Asynchronous Server ACS software, which retails at $995; and NQ1200 and NQ2400 internal modem cards, which are said to provide four modems on a single board and cost $895 and $1,799, respectively.

• Zymacom, Inc. in Westford, Mass., previewed its hybrid business communications system for work groups. The Zymacom Automated Communication Hub (ZACH) is an open-architecture voice and text communication system that uses existing telephone or PBX wiring and office automation equipment. Users can purchase the entire system or integrate their existing telephone and PC resources with selected ZACH modules.

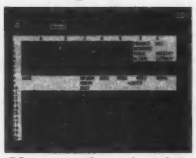
ZACH consists of four modules that reportedly integrate the features of voice and electronic mail, audiotex, automated attendant, productivity tools, speech synthesis and PC local-area network capabilities, the company said.

Users can access the ZACH system through Touch-Tone phones, PCs or other communications terminals. The system's networking capabilities allow PC-to-PC communication of files, the company said. Prices range from $24,500 to $137,000. ZACH is available now.

• Gammalink in Palo Alto, Calif., announced that its Gammafax can automatically send larger than 8½- by 11-in. drawings made with Autodesk, Inc.'s Autocad program to any Group III facsimile machine over standard telephone lines. The software reportedly automatically divides large drawings into sections and sends each section separately. Price is $995.



How to get your PCs on speaking



PC users never have to leave their PC application.

You've got a lot invested in the many elements of your Data Processing operation. Mainframe applications programs. PC software applications. And the necessary micro-mainframe links. But your PCs and mainframe still aren't talking the same language.

Your DP staff is burdened with time-consuming and costly chores. Incompatible interfaces must be learned. Extract and import programs must be written for user after user. Improperly formatted data must be manipulated. And micro-mainframe links must be customized.

Your end-users wait for special requests to be processed. Then they perform the time-consuming task of re-keying data, inviting human error. And, even if your PCs are linked, end-users must leave their favorite PC programs to work with micro-mainframe links and mainframe query languages. Another stumbling block in the path of creating a smooth exchange of information.

The Application Connection™ (T-A-C) from Lotus® is a mainframe and micro software product that lets you realize your investments in mainframe applications, micro-mainframe links and PC applications by connecting them for a fast, secure, uncomplicated exchange of information.

Factory decision-control system developed

AUSTIN, Texas — A factory decision-control system for discrete parts manufacturers was recently announced by Cimpoint, a Computer Integrated Manufacturing Co.

Called the Factory Data Manager, the software system is said to capture real-time information from the factory floor as well as distribute information concerning computer-aided design, manufacturing and process planning; and manufacturing resource planning.

According to Thomas J. Magazzine, Cimpoint president, Factory Data Manager was designed to facilitate the flow of information between the machine tool operator on the shop floor, the engineering and programming departments and plant management.

"Currently, most factory decision control systems are limited to moving data — typically tape image data — to the shop floor. They don't allow for data coming up from the floor," Magazzine claimed.

Uses Ingres DBMS

The Factory Data Manager uses the Ingres relational data base management system from Relational Technology, Inc. It consists of a series of integrated modules including distributed numerical control file server, machine monitoring, automatic production monitoring, electronic traveler, tool presetter, executive program transfer, robot interface, maintenance request and preventive maintenance scheduling.

Designed for use on Digital Equipment Corp. VAXs under VMS, the system can be customized by the user to suit a particular factory environment, company spokesmen said, and can be customized by Cimpoint for use on other 32-bit workstations.

The Factory Data Manager's base price is $25,000, with fully configured systems ranging in price from $80,000 to $120,000, the vendor said.

Bundled AI

CONTINUED FROM PAGE 23

products John Landry, an expert system component added to an order-entry program could be called up while a user is taking an order. The "expert" could prompt the user to inform the customer about different options that fit his order or additional merchandise to sell.

In addition to Cullinet and MSA, M&D and Cincom Systems, Inc. said they are also planning to provide applications with expert system technology, although they could not specify when the products will be available. The vendors said they also plan to provide intelligent front ends for the applications as well as expert system development tools.

"I don't know specifically what they are doing or how they are going to do it," said Robert Hradil, assistant vice-president of headquarters system support at Beneficial Corp., which is currently implementing a number of Cullinet applications. "We can't just react to every new technology. So I don't see expert systems in our short-range goals."

Won't have to relearn systems

But Cullinet and other software companies said expert system technology is not going to change applications to the degree that users will have to relearn their systems. "Think of it as little expert systems hanging off various components of the application," Landry said.

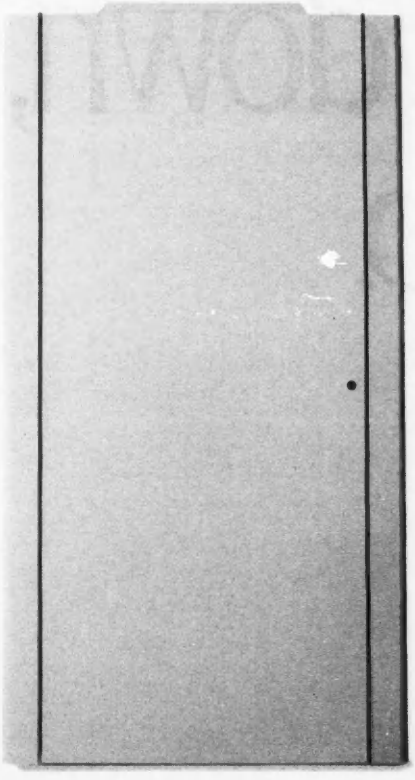
Other companies explained their plans in a similar fashion. Brian Cohen, MSA's director of product planning, said MSA is looking at its applications now to "find places to include expert systems and have it hidden from the customer."

MSA has a joint development and marketing agreement with Aion Corp., which makes expert system development tools for the IBM mainframe environment. With these tools, MSA will develop expert system shells that can be incorporated into the application program, Cohen said. The user, in turn, loads the shell with the rules that constitute the expert information, he added.

Both M&D and Cincom said they are reviewing the areas that would be best handled with expert systems.

"We have identified areas like diagnostic aids and performance monitoring as good for expert systems," said Ronald Weeks, manager of corporate planning at Cincom. "We are in the process of finding out which subroutines or portions of applications would lend themselves most to this technology."

Likewise, M&D continues to examine this area. "We're kicking some different things around," said John Birch, M&D corporate vice-president. "The reaction so far from users is they'd like to hear more."



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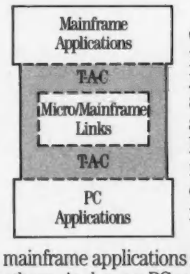

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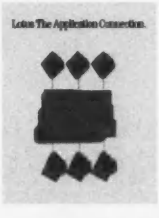

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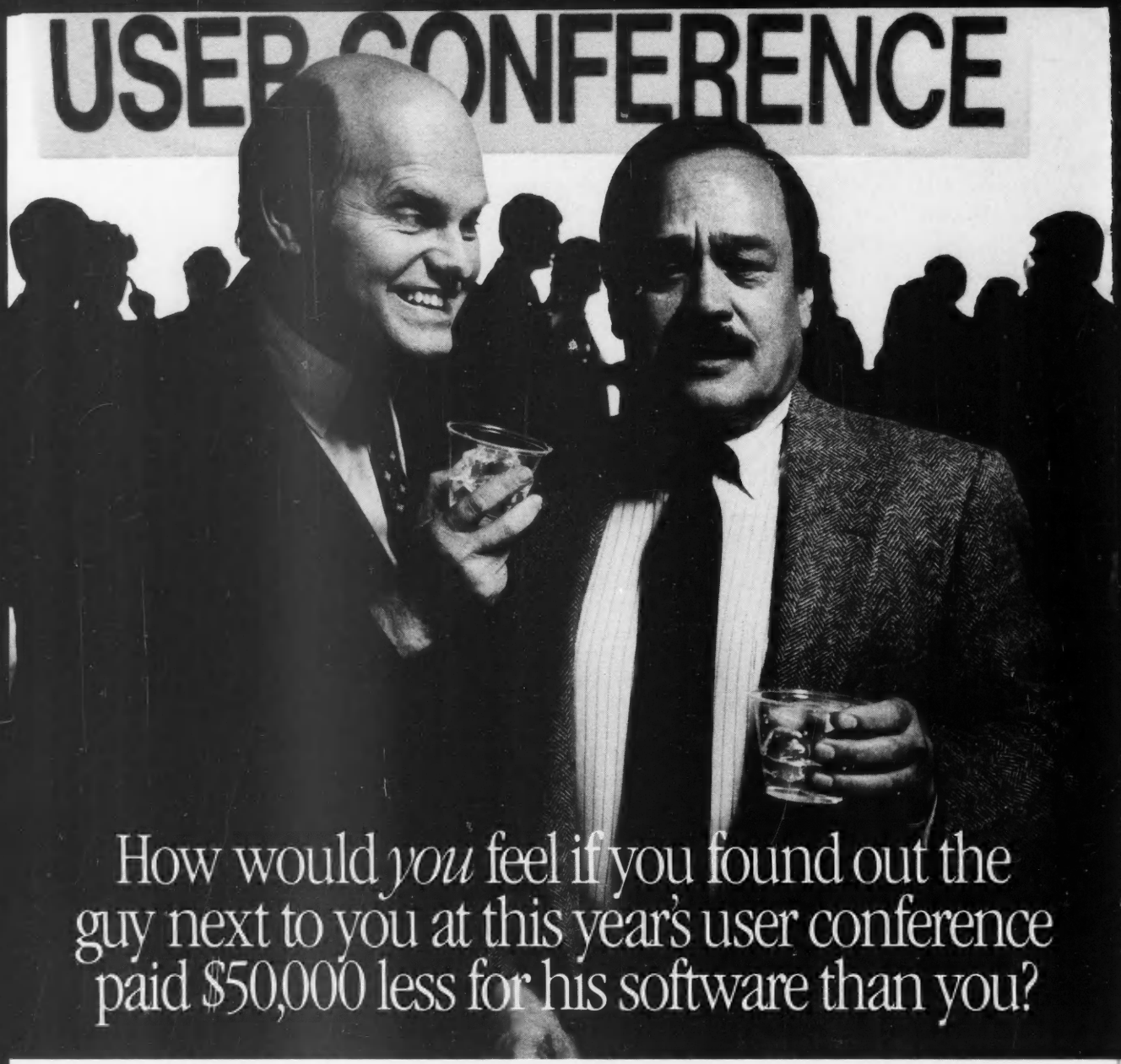

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VSE lock file

CONTINUED FROM PAGE 23

have to convert to IBM's MVS someday, and MVS offers many advantages over VSE that can make it worth a higher price, he says.

'Uncertainty, doubt and dread'

But Young adds that in the situation in which he found himself, "IBM puts pressure on you. It's just pure uncertainty, doubt and dread" until you commit your company to the conversion.

Although not easy, the conversion came off as planned and was executed in six months instead of the anticipated year. Most shops will end up devoting a year to the conversion effort and spend $1 million to $1.5 million to pull it off, plus pay an additional $50,000 to $60,000 a month in operating system costs for the more expensive MVS, he said.

Shortly after this experience, Young quit to form his own company and market Softkey, a program written by his friend, Michael Papeirnik. Softkey creates a virtual lock file under VM in the main CPU memory, eliminating the need to go to the VSE lock file on disk and await a response.

Softkey and similar products, including Extend/VSE from Goal Systems International, Vlock from BMS Computers, Inc., and Cache Magic LF from SDI, address the lock-file bottleneck that tends to afflict VSE systems at times when MIS directors wish the CPU were running at maximum efficiency rather than 50% or 60%.

Now Woodward thinks the Central States conversion could have been delayed for two years if it had had a method of resolving the lock-file bottleneck.

'That weird piece of software'

Terry W. Woodward, lead technical specialist with Storer Administration, Inc., a Miami cable services company, said he had a similar experience after installing Softkey.

"When we first put it in, every time our system hiccupped, our vendor said, 'It must be that weird piece of software you installed,' " he says. Storer uses an IBM 4381 Model 3.

But Woodward was unimpressed. Lock-file I/O accounted for 18% of all his I/Os on the average and a higher percentage during peak activity. By eliminating the lock-file bottleneck, he figures the 4381's dual processors are humming along at 90% to 95% of capacity instead of 60%.

"VSE is not something that IBM keeps on the leading edge," Woodward notes; instead of seeing faults in that "wierd piece of software," he says, "We absolutely flat-out love it." As president of the South Florida VM Users Group, he's been spreading that sentiment around to other VSE users, too.

Babcock is *Computerworld's* senior editor, software & services.

Steel team

CONTINUED FROM PAGE 23

son, Lufkin & Jenrette, Inc. took the contract as a sign that Comptuer Task Group was moving away from its historical emphasis on Cullinet to upscale value-added services; it added Computer Task Group to its recommended stock list.

Cadre Technologies, Inc. in Providence, R.I., recently said it will market a set of computer-aided software engineering tools for Ada software developers. The tool set will be based on technology developed at **General Electric Co.'s** Research and Development Center in Schenectady, N.Y. GE will market the tools, which will be integrated with Cadre's Teamwork family and available in the first quarter of 1988, Cadre said.

Dick Dowdell, author of Masterpiece, the integrated accounting software package formerly marketed by Software International Corp. (now part of **Computer Associates International, Inc.**), has left the application division of Computer Associates to become director of research and development for McCormack & Dodge Corp. in Natick, Mass.

Wang Laboratories, Inc. and **Software AG of North America, Inc.** have announced they will try to tie Wang's Pace application development environment with Software AG's Adabas data base management system and Natural2 fourth-generation language. Wang wants to provide its VS minicomputer users with access to Adabas, VSAM, DL/1 and other standard sequential mainframe files.

Spokesmen for **Applix, Inc.** in Westboro, Mass., said their Alis office-automation system will soon be marketed by NCR Corp. on its Tower line of superminicomputers.

Frank Dodge, chairman of McCormack & Dodge Corp., was seen borrowing a driver from golfing partner **John Imlay**, chairman of Management Science America, Inc. at the September ADAPSO meeting in Colorado Springs, and driving the ball down the fairway. It was the first time the two heads of rival companies, bitter competitors in accounting, human resource and manufacturing applications, had ventured onto the green together, and Imlay reportedly walked off with the wager after demanding his club back and taking advantage of his handicap.

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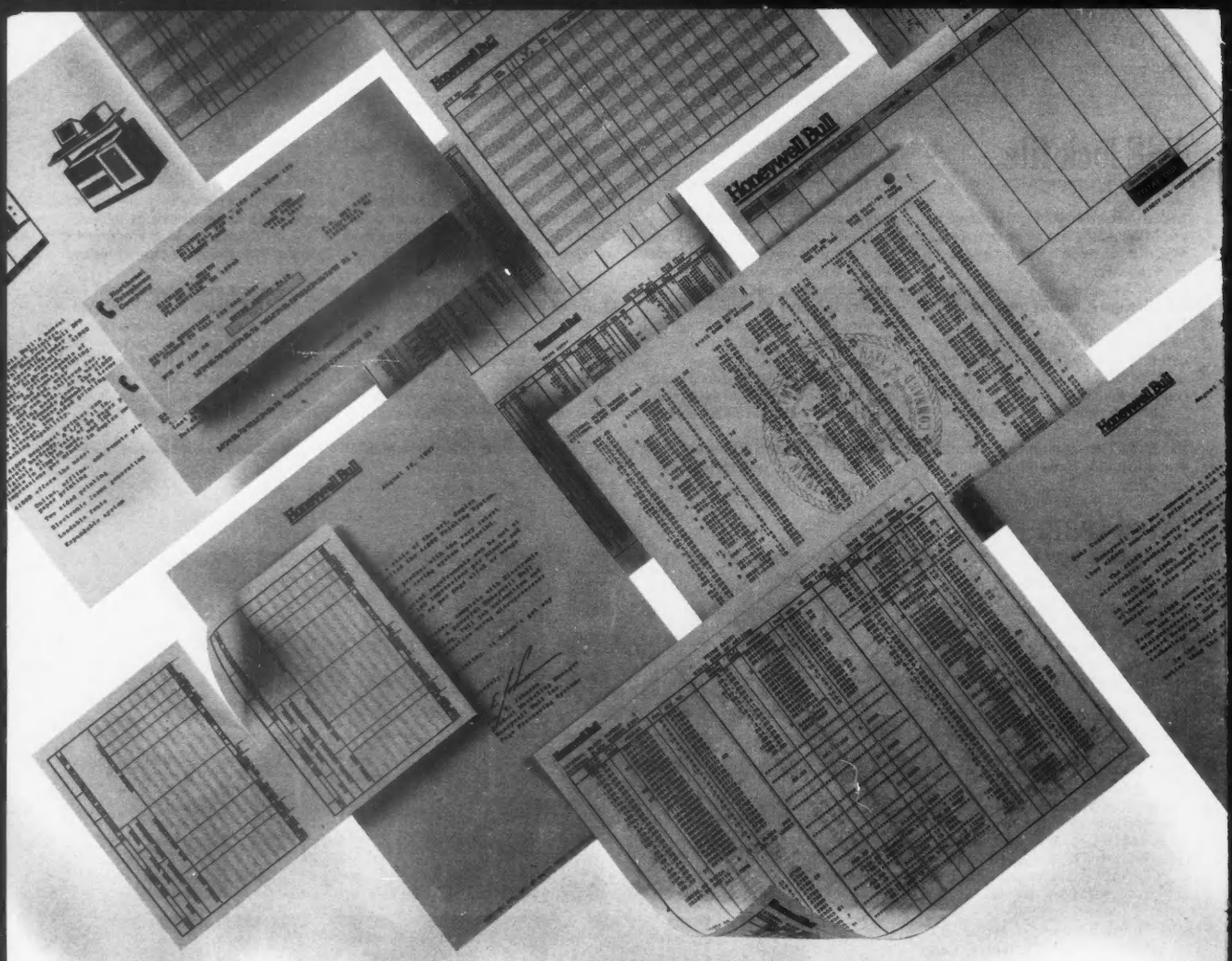

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NEW PRODUCTS

Systems software

System Software Associates, Inc. has enhanced its **World Class Financial System**, a part of its Business Planning and Control System (BPCS) for IBM System/36 and 38 minicomputers.

The BPCS World Class Financial System features a modeling function for creating budget spreadsheets based on prior-year actuals and budgets stored in the BPCS General Ledger. Budget information can be compared with actuals, and multiple budget figures can be consolidated. A built-in mass updating function is included.

The vendor also announced BPCS process industry software enhancements and the BPCS Advanced Systems Implementation Strategy, a proprietary method for information systems implementation.

BPCS software ranges in price from $3,000 to $5,000 per module for the System/36 and from $8,000 to $410,000 per module for the System/38.

System Software Associates, 200 W. Madison, Chicago, Ill. 60606. 312-641-2900.

Blueline Software, Inc. has released an enhanced version of its **Multiterm/SNA** VTAM terminal session manager.

Version 2.2, available for IBM and compatible mainframes, features Help Desk facilities that allow systems programmers and technical support people access to users' sessions to identify and resolve problems.

Other features include such messaging capabilities as logon messages, timed messages, broadcasts and terminal-to-terminal communications. Security features include terminal lock/unlock and controlled application access through menus and Autolog.

Multiterm/SNA Version 2.2 supports IBM DOS/VSE and VSE/SP. A site license costs $10,795.

Blueline, Suite 340, 1500 South Lilac Drive, Minneapolis, Minn. 55416. 612-826-0313.

Interactive Development Environments, Inc. has ported its **Software Through Pictures** integrated computer-aided software engineering products to Hewlett-Packard Co.'s HP 9000 systems.

The product consists of a set of graphical tools including Structured Analysis, Structured Analysis for Real-Time Systems, Structured Design, User Software Engineering and Picture. Each product supports HP's window system.

Graphical editors are used to develop data flow diagrams, state-transition diagrams and structure charts; to define data elements; and to create entity relationship models.

Software Through Pictures on the HP 9000 costs $17,000.

Interactive Development Environments, Suite 210, 150 Fourth St., San Francisco, Calif. 94103. 415-543-0900.

Applications packages

Capacity Requirements Planning, the final package in the Manufacturing System for Wang Laboratories, Inc. VS computers, has been released recently by **MCBA, Inc.**

The package is a shop floor management tool, allowing comparison of each work center's projected load to its available capacity. Features include "what-if" analyses, the ability to calculate work center load from shop orders, firm planned orders and computer planned orders and a graphic load profile.

Prices range from $3,000 to $6,000.

MCBA, 425 W. Broadway, Glendale, Calif. 91204. 818-242-9600.

A computerized on-line time management software package designed to run on an IBM System/34s, 36s and Personal Computer has been announced by **Computer Recovery, Inc.**

The software, called **The Time Clock**, is said to allow employees to clock in or out on any computer terminal linked to the system. Features include reporting capabilities, a message board system and provisions for holidays, hourly and salaried employees.

The Time Clock costs $995.

Computer Recovery, Box 1005, Route 3, Alvarado, Texas 76009. 817-783-2208.

Submit, a CICS performance product for IBM DOS/VSE environments, has been announced by **Data Write Company, Inc.**

Submit allows DOS/VSE JCL to be submitted directly into the Power Reader Queue from CICS. It also allows JCL to be stored in an IBM VSAM data file. A CICS text editor is provided for tailoring and modification. The system comes with installation instructions and a sample job stream to create the data file, several batch systems for building the data file and utilities to maintain the data file. It runs as a pseudoconversational task.

Submit is priced at $1,000.

Data Write, P.O. Box 433, Benton, Ark. 72015. 501-776-1667.

A **geocoding system** designed to simplify census tract information reporting has been introduced by **LPC, Inc.**

The system includes a program that

Continued on page 34

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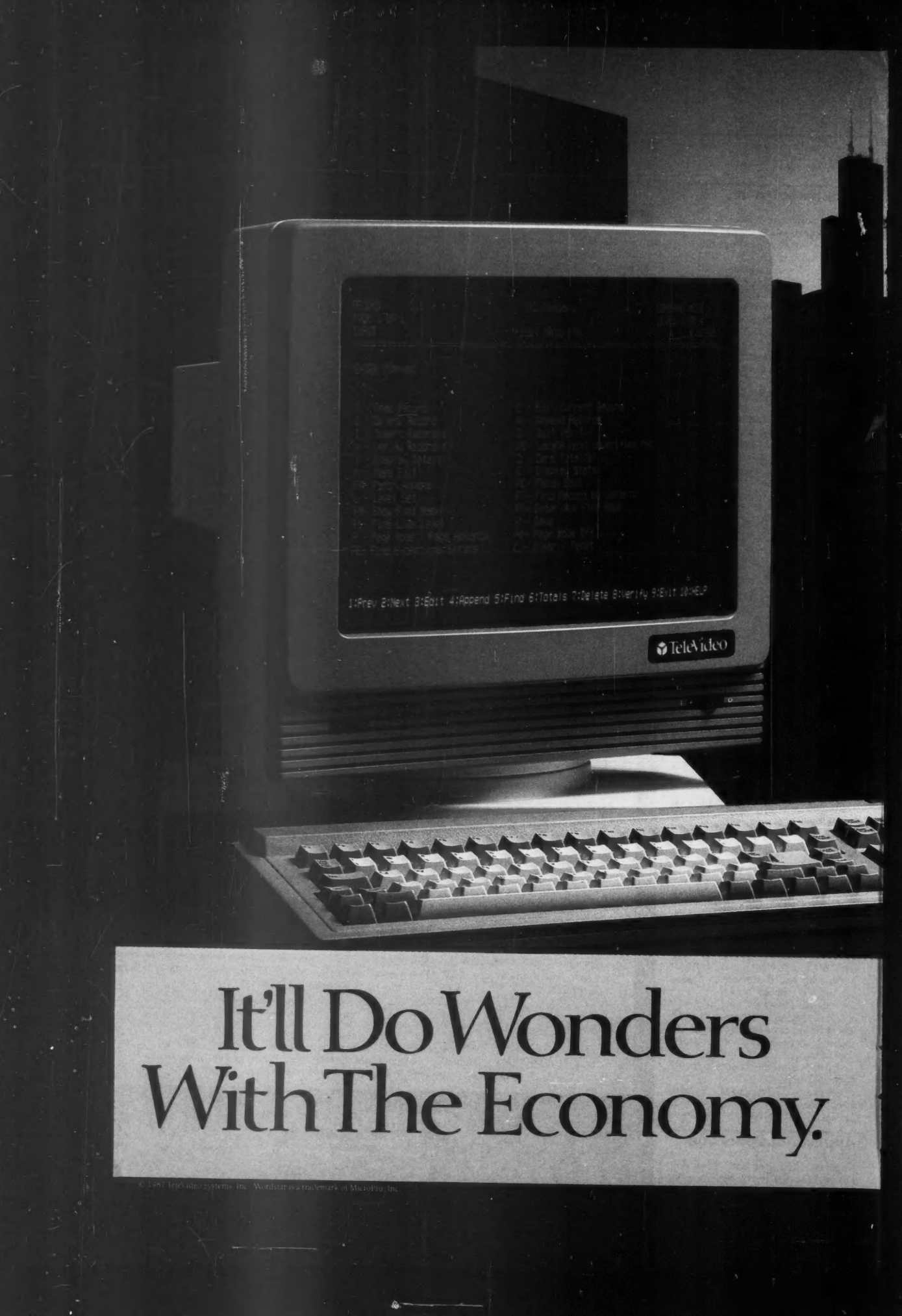

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Continued from page 31
matches an input file ZIP code or ZIP+4 code to the census tract system data base and returns the census block, Standard Metropolitan Statistical Area code and Federal Information Processing Standard state and county codes. The data file is available as a VSAM data base, accessible as a geographic data file.

Through Finalist, census tract information can be added to the file along with the ZIP code, ZIP+4 code and carrier route code in a single pass. System output includes a statistics report.

The geocoding system, accessed via Finalist, costs $10,000. The geographic data file costs $2,500.

LPC, 1200 Roosevelt Road, Glen Ellyn, Ill. 60137. 312-932-7000.

An initial graphics-exchange specification (IGES) 3.0 translator has been announced by **Hewlett-Packard Co.**

The **HP ME** version of IGES is intended to allow the translation of mechanical engineering design data between the HP ME Series 10/30 products and other mechanical engineering computer-aided design systems that support IGES software. It provides a bidirectional link between HP ME Series products and the HP Printed Circuit Design System. Features include batch-mode capabilities and user-defined optimization.

The translator supports all HP ME Series 10/30 two-dimensional geometry. It runs on HP 9000 Series 300 technical workstations under the HP-UX operating system. It costs $3,000.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303. 800-367-4772.

Dbsize, a data set management utility designed for Hewlett-Packard Co. 3000 computers, has been announced by **Hawthorne Computer Center.**

According to the vendor, Dbsize can ensure that users do not experience full data sets by increasing the capacity of any data set in a data base found with entry counts exceeding a specified percentage capacity.

Dbsize runs on HP 3000 systems using MPE-IV or MPE-V with Image or Turbo-image. It costs $495.

Hawthorne Computer Center, 3454 S.E. Powell Blvd., Portland, Ore. 97202. 503-239-4778.

Software designed to enable users of CICS to reduce file accesses in an on-line environment has been introduced by **Main Frame Software Products Corp.**

The product, called **Save/IO**, holds heavily accessed records in storage, eliminating the need to access a direct-access storage device. According to the vendor, it is transparent to the user.

Save/IO operates on all types of VSAM files, the vendor said. It provides analytical tools to show how and where to achieve the maximum savings from files placed under its control.

License fees range from $11,900 to $14,900.

Main Frame Software Products, 135 Glen Road, Wellesley, Mass. 02181. 617-239-0288.

A disk-structuring program for Digital Equipment Corp. VAX systems said to feature automatic operation has been announced by **Software Techniques, Inc.**

The **Diskit 2000** employs a flexible integral scheduler that lets a system manager set daily or weekly operations and run intervals and start/stop times without using batch files. The program runs as a spawned background process that restructures mounted disks for normal user and VMS operations.

Diskit 2000 is priced from $500 for Microvax systems to $3,000 for VAX 8800 systems.

Software Techniques, 6600 Katella Ave., Cypress, Calif. 90630. 714-895-1633.

Development tools

Apollo Computer, Inc. has announced that Index Technology Corp.'s **Excelerator/RTS** real-time systems analysis and design software now runs on Apollo workstations.

Excelerator/RTS runs in one window in the Apollo environment. Users are said to be able to simultaneously display multiple windows of Excelerator/RTS data.

Other features of the software include four diagram types that document the time and control processing requirements of real-time systems as well as facilities for validating and cross-referencing design data.

Excelerator/RTS runs under Apollo's Domain/IX operating system. It costs $8,400.

Apollo, 330 Billerica Road, Chelmsford, Mass. 01824. 617-256-6600.

Gigamos Systems, Inc. has ported its expert control software system, **Picon**, to the Symbolics, Inc. 3600 and Texas Instruments, Inc. Explorer LISP processors. It has also ported its real-time interface, **Rtime**, to the IBM Personal Computer AT and the Digital Equipment Corp. VAX systems.

Picon is said to be an on-line real-time expert system capable of making expert decisions based on real-time plant data, heuristic knowledge for process experts and structural knowledge of plant elements.

Rtime is a gateway designed to provide a real-time interface between Picon and external process control systems or other sources of dynamic data.

Picon and Rtime are priced at $28,000 and $12,000, respectively.

Gigamos, 650 Suffolk St., Lowell, Mass. 01854. 617-458-9100.

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[1] Based on standardized ETI Benchmark. Results published by FT Systems Newsletter, 1987 ITOM Inter. Co. [2] Audited results published 10/12/87. [3] Using NonStop SQL™. [4] Prices for systems: Sequoia $929,000; Tandem $995,300; Stratus $630,000.

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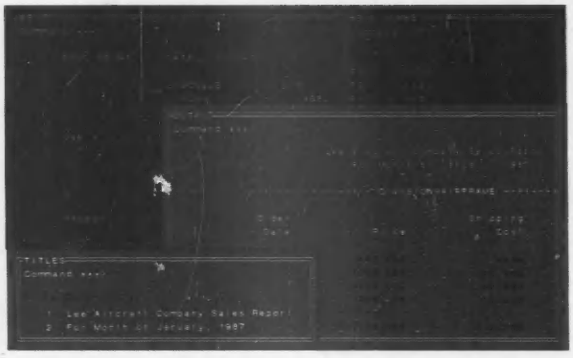

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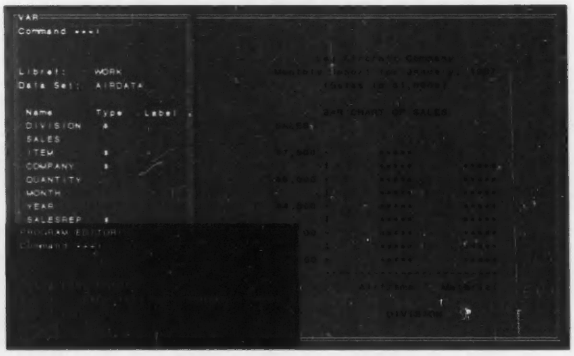

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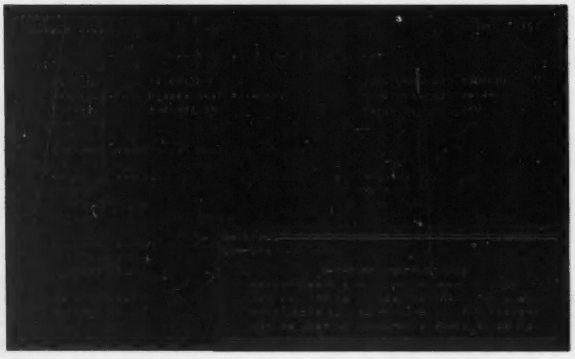

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MICRO BITS

Ed Scannell

Stuck in the middle again

Can't win for losing. Some analysts are giving Lotus the "Noogie Of The Month" award for its announcement of 1-2-3 for the Mac — which won't be available for about a year. Now, while Lotus could be penalized 15 yards for piling on, one must appreciate the ticklish situation Lotus is always in. If the company waited until next summer to announce its Mac plans, customers would accuse the firm of not letting them know which direction it's going in. And if they announce too soon, the press jumps all over them for announcing vaporware. Somewhere, however, there's got to be a middle ground.

Rumors, we've got rumors. One of the best this week is that IBM won't come up with faster disk drives for its Personal System/2 series until February. Word is it will take that long for IBM to put the various products being considered through the paces to see if they meet the company's exacting standards. Rumor mongers say the company is taking a hard look at drives from Seagate. Another

Continued on page 42

Package bridges Focus-Dbase gap

Information Builders uses PC Focus know-how in PS/2, IBM PC tool

BY ALAN ALPER
CW STAFF

NEW YORK — Drawing on its extensive experience with its Focus data base management system and fourth-generation language, Information Builders, Inc. recently developed a report writing and decision-support package for use with Ashton-Tate Corp.'s Dbase III and Dbase III Plus. The product is slated to debut at Comdex/Fall '87 in Las Vegas next week.

Called Focus Report Writer, the $349 package offers a menu-driven interface, enabling users without prior programming experience to make ad hoc queries and create reports and three-dimensional color graphs from Dbase files. More experienced users, however, can bypass the main menu and operate at the command level, the firm said.

The package borrows some elements from the vendor's PC Focus, such as its windowing tool kit, Window Painter, but offers a different front end, said David Feldstein, vice-president of Information Builders' Micro Products division.

"This is our first mass-market-appeal product," Feldstein said in reference to the approximately 1.5 million Dbase users. "This product will introduce them to Focus, and when they are ready to step up, they'll be familiar with 50% of the [Focus] language."

Feldstein said Information

Continued on page 45

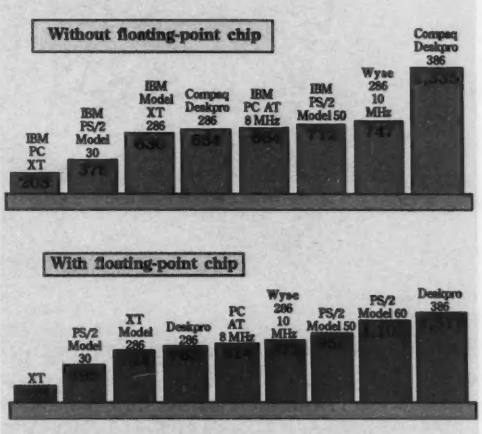
Inside

- Profile: Author Russ Walter reveals PC users' most common problems. Page 39.
- Pope's West Coast tour itinerary planned on Apple computers. Page 39.
- Fliptrack teaches Microsoft basics. Page 51.

Data View

Microcomputer performance

Selected systems' performance with and without floating-point chip*



*Measured in Khornerstones, defined by Workstation Laboratories as a benchmark test that is a weighted average of CPU, floating-point and I/O performance

INFORMATION PROVIDED BY WORKSTATION LABORATORIES, INC.
CW CHART

Start-up preps keyless laptop, eyes '88 ship

BY MITCH BETTS
CW STAFF

Linus Technologies, Inc., a start-up firm in Reston, Va., will introduce a wholly unconventional product in early 1988 that resembles a laptop microcomputer but replaces the keyboard with a pen-like stylus and a screen that reads handwriting.

The user writes with a stylus directly on the glass display, whereupon the handwriting is instantly digitized, recognized and converted into ASCII characters. Officials said it takes about 30 minutes to initialize the system, enabling it to learn the user's handwriting, including symbols and shorthand notes.

The company's "handwritten symbol recognition" algorithm is employed in an electronic writing tablet called Linus. It is intended for use in vertical markets in which a keyboard is impractical or unpopular. It will be priced from $2,500 to $3,600, depending on software and options, the vendor said.

Linus *reads handwriting*

Baxter Healthcare Corp., a major hospital supply company

Continued on page 45

IMS DB/DC on a PC? They said it couldn't be done. It's now available as an option for VS COBOL Workbench.

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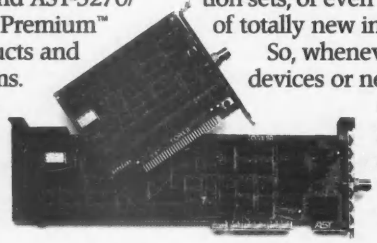

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SMALL TALK

William Zachmann

Scorching desk tops

It is clear that however successful IBM might have been on the desk top with the IBM Personal Computer, PC XT and AT, leadership in other key computing categories has been seized by other firms.

Compaq Computer Corp. started this trend with the first more-than-IBM-compatible portable systems. In the laptop arena, it was the Japanese vendor Toshiba that emerged as the forerunner.

Despite tough competition in these markets, IBM managed to stay solidly in the lead among desktop systems based on Intel 8088 and 80286 microprocessors.

Jockeying for lead

IBM's front position in the desktop systems race was thought to be secure by most observers. That is until Compaq once more stepped into the fray with the original Compaq Deskpro 386.

By being there "firstest with the mostest," Compaq again seized the initiative.

Compaq's early start with an excellent product threatened to send IBM's Personal System/2 Model 80 the way of the IBM Portable.

That threat, already a serious one, has recently been elevated to near-cosmic proportions with the introduction of the Compaq Deskpro 386/20.

Built around the 20-MHz 32-bit Intel 80386 microprocessor, the Deskpro 386/20 redefines the conception of state of the art with regard to desktop personal computer systems.

In the first place, this thing is

Continued on page 44

Cost-conscious Walter champions clones, coaches users in corporate computing

Unconventional Russ Walter, a computer guru who makes his home near the technological heartland of Route 128 in Massachusetts, claims both he and the stored-program computer were conceived in 1946.

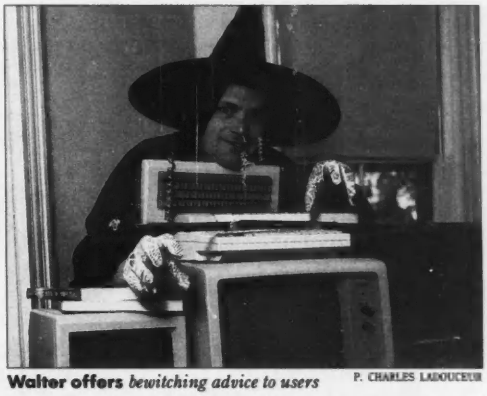
Walter, who could be called "The Champion of the Clones," is the author of the informative and entertaining *The Secret Guide to Computers,* Vols. 1, 2 and 3. The books sell for $8 and offer information on everything from how to load a floppy disk to how to program in Basic.

IN PERSON

The author holds degrees from Dartmouth College and Harvard University, has spent time teaching at various levels and was a founding editor of *Personal Computing* Magazine.

For nearly 10 years, Walter has been writing about and conducting private classes on computers from his Somerville, Mass., home, a space he shares with some 40 microcomputers. He claims to be at home about 85% of the time, and he urges his readers to call him there anytime, day or night.

Walter recently discussed the computer woes of corporate America, IBM's Micro Channel architecture and the importance of clones with *Computerworld* staff writer Alan J. Ryan.



Walter offers *bewitching advice to users* P. CHARLES LADOUCEUR

How will IBM's Micro Channel architecture affect the future of microcomputing?

It seems clear that the Micro Channel is superior to the old bus, but since IBM charges 2½ or three times the price of the no-name clones for computers of comparable power, I consider IBM computers, at the moment, not to be a cost-effective solution to most business problems.

If the price on the Micro Channel drops in the future — either because IBM lowers its price or someone legally clones it — then my enthusiasm will go up. I'm a very price-sensitive person. If people say, "I don't care about the price, I want only the best," then I say, "Yes, but with all the money you save by not buying IBM, you could use that money for so many other purposes."

Do IBM clones belong in the business environment, given the fact that many of them don't have as much service and support?

I'd like to point out Radio Shack's argument. When [Tandy Corp.'s] Radio Shack first started selling their computers, people said, "I wouldn't trust buying from Radio Shack. What if it breaks? Can I trust this company to fix it?"

Radio Shack said, "Our computers are so cheap, you can buy two of ours for the price of one of theirs; so, you always have a spare, your downtime is zero."

What are the problems facing corporate users?

I get calls [from users] on which computer to buy and how to use the computer they bought. Problems involve people trying to configure their software, people trying to figure out how to do

Continued on page 44

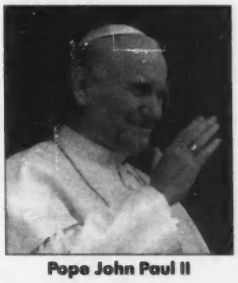
Mac helps Pope keep busy schedule

BY JULIE PITTA
CW STAFF

LOS ANGELES — Pope John Paul II's recent tour through the U.S. represented another milestone in the history of the Roman Catholic Church. What many do not realize is that his visit was a technological feat as well.

The pontiff's two-day stop in Southern California was planned with the help of Apple Computer, Inc. Macintosh personal computers. Apple loaned eight Macintosh Plus computers, Laserwriter printers and several software packages to McGuire, Barnes, Inc., a San Francisco-based public relations firm charged with planning the Pope's stay here.

Walter McGuire, a principal of the firm, said the Mac was selected because of its versatility and Apple's willingness to loan the computers. "We needed a lot of functions," McGuire said. "We were keeping track of a $2.5 million budget, we needed to do a lot of word processing, and we needed to create diagrams. It's easier to use than most personal computers."



Pope John Paul II

IBM and Compaq Computer Corp. microcomputers owned by the Archdiocese of Los Angeles were used to compile a data base of invitations for various functions held during the pope's stay.

But the Mac did the lion's share of the work, McGuire said. Macintoshes were used to plan Pope John Paul II's itinerary for his whirlwind tour, which covered the Los Angeles and San Fernando counties. That is no simple task, since the pope's goal was to cover as much ground in as little time as possible.

Using Apple's Macdraft package, McGuire and his staff charted the pope's journey, beginning with a "popemobile" parade through Los Angeles and culminating with Mass at Dodger Stadium. The pope met with U.S. bishops at Lady, Queen of Angels Mission in San Fernando,

Continued on page 44

Study: Not all floppy disks are created equal

BY ALAN ALPER
CW STAFF

OMAHA — While price and quality vary widely among name-brand floppy disks, there is little correlation between the two, according to a recent study conducted by a manufacturer of diskette testing and duplication equipment.

The study, done by Memory Control Technology Corp. here, measured 18 brands of double-sided, double-density 5¼-in. floppy diskettes against the ANSI-standard X3.125, a 1985 standard agreed on by the American National Standards Institute. Memory Control Chief Executive Officer Gerald Korth said his firm, which also provides duplication services, decided to conduct the study because of concern over the deterioration in the quality of floppies during the last few years.

"It seems floppy-disk makers might be getting careless as they pursue lower prices and increased market share," he said. "We're concerned because we're a large user of diskettes and buy them in bulk. We thought a study would not only help us but could be helpful to our customers as well."

Prices of the diskettes studied varied by more than 200%, even for the same brand, Korth said, indicating price gouging by some distributors and possible predatory pricing by others.

As part of the study, 10 boxes of each of 18 brands were purchased from various distributors across the country at quoted prices. The average price was $9.60 for a box of 10 diskettes, ranging from a low of $4.40 for Xidex Corp.'s Precision brand to a high of $23.90 for Dysan Corp. disks. Interestingly, the Dysan box, which sold for $23.90 at one distributor, was also purchased for $8.40 at another, Korth noted.

The quality of the diskettes had little bearing on the price quoted, Korth said, noting that buyers should be wary of both very expensive and very inexpensive floppies.

Lack of consistent quality control, as evidenced by visual flaws and package contamination, was a problem for some of the vendors' products tested, Korth said. "This shows that although all vendors say their products are 100% certified, that is not the case," he noted.

Diskettes were examined for eight types of visual defects, including frayed and visible liners, jacket deformities, labeling inconsistencies and contamina-

Continued on page 43

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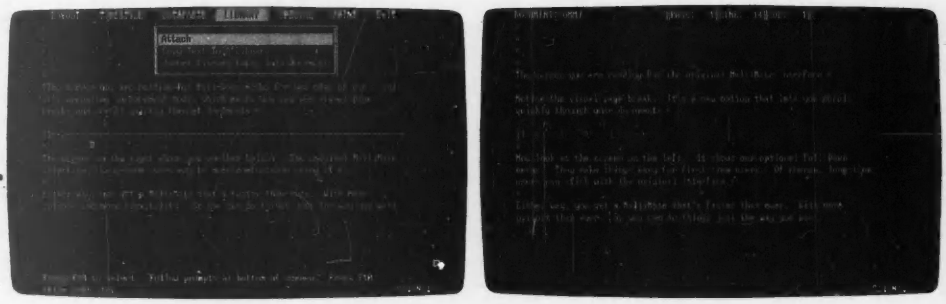

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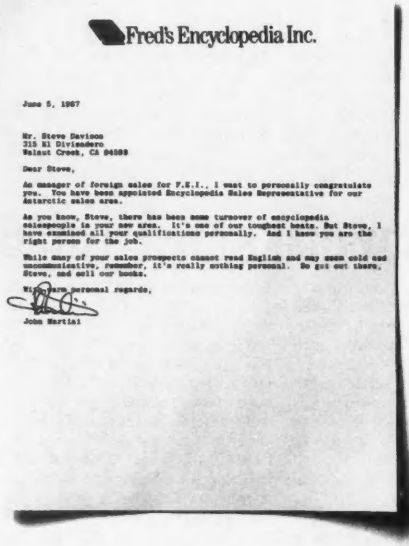

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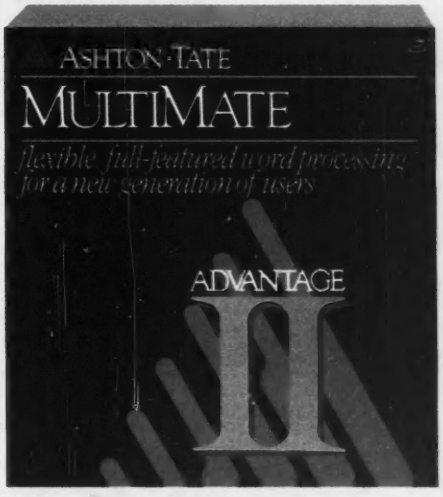

ASHTON-TATE®

In the middle

CONTINUED FROM PAGE 37

reason for waiting until February is because that's the month IBM may roll out its long-awaited Model 70.

Kissin' Intellin'. Another good rumor is that Intel is working on a chip product (not a coprocessor) for Apple's Macintosh set to be released probably late next year, a source close to the company says. The company is also rumored to be making a major board announcement for the PS/2s at next week's Comdex/Fall '87 show. And, if you can stomach this one, sports fans, the same sources tell us they expect the Intel 80486 to be announced in late 1989. The chip will have one million transistors and will have speed and performance approaching that of an IBM 3083. What users could do with a mainframe on their desktops only God and Bill Gates know for sure, but I'm sure ol' Bill will let God know.

Gettin' the LEDS out. Yet another interesting rumor is that Lotus is beta-testing its Lotus Electronic Distribution System (LEDS) among "eight or 10" large corporate sites. Some speculate that the company will formally announce LEDS when it introduces 1-2-3 Release 3.0 early next year. And by the by, one friend whispered to us recently that 3.0 is faster than a speeding bullet and should keep 1-2-3 users from being too carried away by Microsoft's Excel.

Computing for the upwardly (auto)-mobile. Rob Relf is an inspiration to home-grown propeller heads who think they have to junk their old PCs in order to cut it on technology's razor edge. Relf, an auto mechanic living near Seattle, bought a PC in 1981 that had just 64K bytes of memory. Since then, he's added an IBM Personal Computer XT motherboard, a 20M-byte hard drive, a laser printer, a 2,400 bit/sec. modem, an IBM Enhanced Graphics Adapter board and a NEC Multisynch monitor. He's thinking of adding a Mach 20 board when it becomes available, along with some more memory. With this configuration, Relf could run OS/2 on the original PC. Well, sort of the original PC. The only way you could identify the original PC through all that high-tech is by its dental charts.

Computers have been berry, berry good to me. In a recent salary survey of computer executives, Apple Chairman and Chief Executive Officer John Sculley came out No. 1 among microcomputer executives, taking down $1.6 million in 1986, a 61% increase over 1985. In second place was Ashton-Tate Chairman Ed Esber, who pulled down $943,237 last year. Others who don't have to worry about cost-of-living raises include Lotus Chairman Jim Manzi, who made $794,572, and former Lotus Chief Financial Officer Mick Prokopis, who made $427,116. Mothers, I'd encourage your babies to grow up to be programmers.

Quote of the week. "The only thing that sticks to our diskette is people's data." Richard T. Bourns, president of Verbatim, talking about his firm's recently announced Teflon-coated floppy disk.

Scannell is a *Computerworld* senior editor, microcomputing.

Epson targets PC products at Fortune 2,000 market

TORRANCE, Calif. — Epson America, Inc. has introduced four microcomputer products targeted at Fortune 2,000 users, including a laptop and an IBM Personal Computer AT compatible.

In the laptop arena, the company announced the Equity LT, an Intel Corp. 8086-compatible unit that offers a detachable backlit or supertwist LCD screen. The unit includes 640K bytes of random-access memory and 16K bytes of read-only memory (ROM). It supports two internal 3½-in. floppy disk drives with 720K bytes of storage and an external 5¼-in. floppy disk drive with a 360K-byte storage capacity.

Equity II replacement

Also announced was the Equity II+, a small-footprint AT-compatible computer designed to replace the Equity II model. The Equity II+ includes an Intel 80286-based microprocessor with selectable clock speeds of 8 or 10 MHz, 640K bytes of ROM, six expansion slots and a 1.2M-byte floppy disk drive.

Options to the desktop computer include a 40M-byte hard disk drive, a 360K-byte floppy disk drive and video option cards and display monitors. Retail price for the fixed-disk model is $2,795. Both the laptop and the AT compatible will be distributed in January, the vendor said.

Also announced were the LQ-850 and the LQ-1050 printers. The 850 is an 80-col. model, and the 1050 is a 136-col. version. Both are equipped with 24-pin printheads and allow the user to print an envelope or single sheet without first removing the continuous-feed paper from the tractor feed. The LQ-850 and LQ-1050 are available now and retail for $199.95 and $249.95, respectively.

IF YOU NEED TO KNOW WHO, WHAT, W

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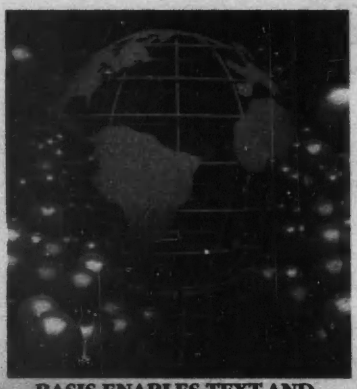

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Bridge/386 lets users combine popular packages, build applications

CAMBRIDGE, Mass. — Softbridge Microsystems Corp. recently introduced an extension to Microsoft Corp.'s Windows 386 that it said allows users to integrate Windows 2.0 and Microsoft MS-DOS applications.

Called Bridge/386, the development tool lets users combine popular programs such as Ashton-Tate Corp.'s Dbase III, Lotus Development Corp.'s 1-2-3 and Microsoft's Excel as well as build integrated end-user applications.

The program is said to allow automatic interprocess communications and control capabilities for Windows 386. It can provide task control across a network as well as within a single machine, according to company spokesmen.

Bridge/386 "enables a corporate developer to use Windows 386 multitasking capabilities on a 386 without having to abandon his investment in current DOS software and products," said Mark Eisner, president of Softbridge.

Bridge/386 can be used to for real-time communication through an IBM 3270 emulator interacting with other Windows 386 programs and for real-mode applications running under Windows 386 providing true MS-DOS multitasking. It allows for close interaction between an Intel Corp. 80386-based file server and an IBM Personal Computer AT-class workstation on an IBM Netbios-compatible network.

The program also supports the Dynamic Data Exchange interfaces to applications such as Excel and extends the same interface to existing applications such as 1-2-3.

Hardware requirements for running Bridge/386 include an 80386-based system with Windows and at least 2M bytes of random-access memory. The product is available now, the vendor said.

Cartridges boost capacity

SAN DIEGO — Data Electronics, Inc. recently introduced a quarter-in. data cartridge that reportedly allows capacities of up to 0.5G byte in the 5¼-in. form factor and 100M bytes in the 3½-in. form factor.

The Series II Gold Plus cartridges provide 60% to 70% higher capacity than most cartridges and have the same media formulation and tape guiding mechanics as Data Electronics' Series II Gold Plus design, a spokesman said.

The 5¼-in. Series II Gold Plus 1000 extends tape length from the standard 600 to 1,000 ft. The 3½-in. Series II Gold Plus Microtape 2000XL cartridge extends tape length from the standard 205 ft to 300 ft, the vendor said.

Both products can be used with all the popular tape drives and offer capacities that vary depending on the tape length and drive and its recording format, the vendor said.

The 5¼-in. product accommodates drives ranging from 100M to 500M bytes of storage, while the 3½-in. product gives minicartridge users up to 100M bytes of capacity.

Sample units of the Series II Gold cartridges are available immediately.

The Gold Plus 1000 has a suggested retail price of $59, and the Gold Plus Microtape 2000XL is priced at $35.

Data Electronics will ship both products in volume in January, a spokesman said.

Floppy disks

CONTINUED FROM PAGE 39

tion, Korth said. Five of the manufacturers' products tested — Dysan, Goldstar Electronics International, Inc., Syncom, 3M Corp. and Verbatim Corp. — scored poorly in the quality control area, while Fuji Electric Corp. of America, Eastman Kodak Co., Memorex Corp. and TDK Electronics Corp. tested well.

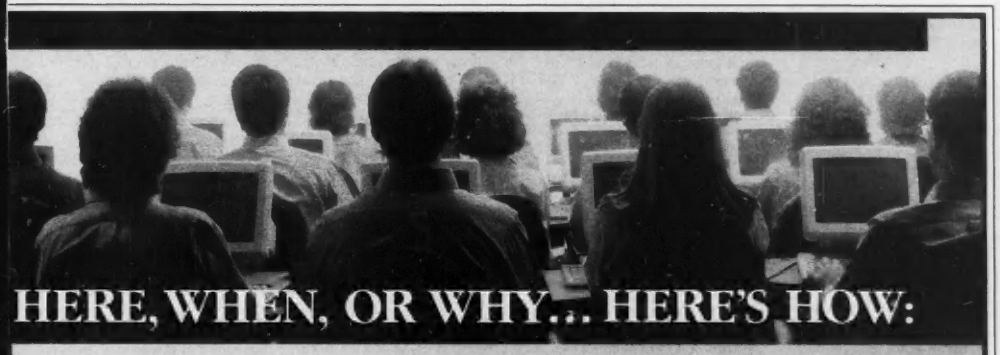
"One product tested had two cookies inserted in the same jacket," Korth recalled. Cookies are the actual magnetic medium. "That indicates the product could not have been certified before being shipped."

In the ANSI missing-bit test, a widely accepted barometer of quality, only seven vendors of the 18 had 100% of their diskettes pass. Those with passing grades included BASF Corp., JVC Corp., Kodak, Memorex, Nashua Corp., Sony Corp. of America and 3M.

All manufacturers did well on amplitude, modulation and resolution tests, the study said. One area where the diskette industry shows improvement is on wear resistance, the study proved.

Although ANSI has not come up with a standard for wear resistance, three million revolutions has become an accepted benchmark. All of the tested products measured up, indicating that diskettes should withstand several years of normal use without wearing out.

Overall, Korth said BASF, JVC and Memorex achieved the best grades in the study. Which brand of diskettes does Memory Control use? "BASF and JVC," Korth replied.



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The Pope

FROM PAGE 39

and convened with leaders from the Buddhist, Hindu, Moslem and Jewish faiths at the Japanese American Cultural and Community Center.

A diagram of the pontiff's travel schedule was printed on the Laserwriter for use in several briefing brochures. McGuire and staff printed 400 briefing books for the bishops and 100 for the pope's traveling staff, as well as 4,000 media guides. They used Apple's Macwrite to compose text for those publications, which ran about 30 pages each.

Finally, Microsoft Corp.'s Excel was used to create spreadsheets on the Macintosh to manage the papal budget.

Did the pope ever glimpse a Macintosh during his visit? "He never used one, as far as I know," McGuire laughed. "I doubt he even saw one."

Although it is questionable whether Pope John Paul II became a Macintosh convert, McGuire, who currently uses IBM and Compaq PCs in his office, has become a believer. "I think we'll be switching over to the Mac," he said. "It is the ease of use [that is convincing], and I like the screen."

Walter

FROM PAGE 39

something weird that they can't find in the manual and people whose computers break and they want to know if there is any way they can fix them themselves without getting a large repair bill.

The only question I refuse to answer is how to use software that people didn't pay for. Half of the software questions I get are from people who don't have a manual.

Judging from your calls from corporate users, is corporate America adequately supporting its users?

I think they're making a reasonable effort.

How?

Let me just say that the main beef I have about corporate America is that a lot of people are shown a particular software package but haven't learned quite enough about the computer yet. So if they get flustered on some point, they don't have enough overall understanding to know where to turn.

For example, some people are told how to use a package but aren't told how to make backups, how to use DOS commands [or] what a subdirectory is and just have a generally weak background.

Do you find MIS people calling you for advice?

Yes. I do get a lot of questions along those lines. A typical conversation goes like this: "IBM wants to sell us a computer system for over $100,000. What do you think, Russ?"

And I say, "Well, you put together a bunch of clones for about $20,000 or $30,000 that will do the same thing. Moreover, do you really need to network these? Are you really having people sharing data? Do they need to have immediate access to that data?"

If not, it's more reliable just to have a bunch of stand-alones. The problem with anything where you're tied into one big machine — or where you're networking to one big hard disk — is that if the big machine or disk dies, the whole company is out of work. Whereas if you have a bunch of stand-alones, if one machine dies, you can just wheel in a little cheap replacement. You can always have one sitting in the wings.

How about the Apple Computer, Inc. Macintosh in corporate America?

The IBM PC and the Macintosh are converging.

When the Macintosh first came out, the Mac's advantage was that software was easier to use, but that IBM had the advantage of running faster. As time goes on, people are putting Macintosh-like software on the IBM, and Apple is making the Mac faster.

They [the two products] are competitive against each other, but neither is competitive against the IBM clones. And since the Mac cannot be cloned, I don't usually recommend the Mac environment, unless you get a discount or care about music or other specific software that exists best in the Mac environment.

Compaq

FROM PAGE 39

fast. It makes the 10-MHz 286-based IBM-compatible system that I use in my office — and that runs at just about the speed of a PS/2 Model 60 — look like it's standing still.

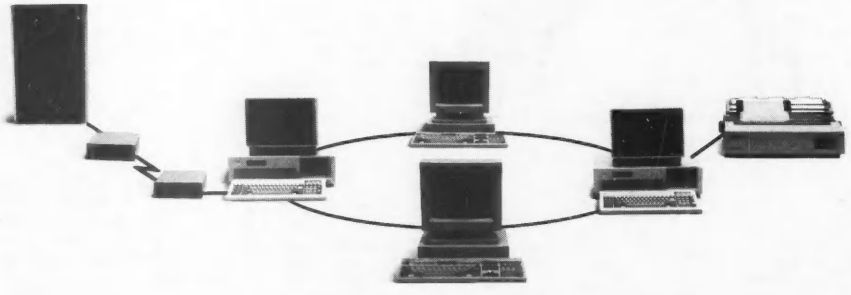
Of course, the Deskpro 386/20's 20-MHz 386 is a big contributor to its speed. There's more to it than that, however. Use of the Intel 82385 cache-memory controller and 32K bytes of cache memory help, too, as does a 130M-byte hard disk with an access time of less than 20 msec, which was on the model I tested.

There's much more to the Deskpro 386 than blinding performance. For example, the Microsoft MS-DOS 3.3 shipped with the Deskpro 386/20 leaps out ahead of anything available from other vendors — including IBM — by offering fixed disk-drive partitions of up to 512M bytes. This is, I believe, the first version of MS-DOS from any OEM that breaks the 32M-byte barrier.

Priced starting at $7,499 for the PS/2 Model 60 with a 60M-byte hard disk and ranging to $12,499 for the Model 300 with a 300M-byte disk, the Deskpro 386/20 isn't for everyone's budget. But for those who want state-of-the-art performance and capability and are willing to pay for it, Compaq's Deskpro 386/20 is ready to deliver.

Zachmann is vice-president of research at International Data Corp.

Your LAN-Gateway doesn't need to run 56Kbs.



RabbitGATE™ is the fastest 3270 and RJE remote host connection for NETBIOS LANs around. That in itself is something you may not require now. But it's nice to know the capability's there when your needs change. Of course, it's just as important to know that, no matter how fast—or slow—you drive it, RabbitGATE performs file transfer up to twice as fast as the competition. In either BSC or SNA.

That's because RabbitGATE has its own onboard dedicated 80186 processor and 512k of RAM. So when compared to other gateway products, which downgrade your workstation into a dedicated controller, RabbitGATE can save up to 50% of your workstation's processor and RAM.

You'll also find RabbitGATE easy to use. Installation and configuration take just a few minutes. As opposed to hours for the competition. In fact, initial installation and start-up is so easy, most people don't ever open the user guide.

As if saving you time and memory wasn't enough, RabbitGATE also saves you money. It's priced competitively, yet offers unique

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Diconix preps portable printer for Comdex rollout

BY ALAN J. RYAN
CW STAFF

DAYTON, Ohio — Diconix, Inc. recently said it will introduce a transportable ink-jet printer designed to accommodate plain paper up to 14.8 inches wide at next month's Comdex/Fall '87.

Called the 300W, the printer is geared toward users who require a quiet low-end printer, such as business offices, hospitals and accounting offices, according to William Garippo, strategic business manager at Diconix.

The latest offering from Diconix reportedly can work at rates of up to 308 char./sec. in draft mode and 73 char./sec. in near-letter-quality mode in elite. It can handle printouts up to 136 columns wide, the vendor said.

Disappearing ink-jet woes

Although Garippo admitted that ink-jet technology has acquired a bad reputation in the past because of clogging ink nozzles, he maintained that many of the problems associated with ink-jet technology have been resolved.

"We developed our own inks; we add a special chemical to them to avoid clogging," Garippo said. "At times, the user must prime [the printer], especially after long periods of nonuse." Garippo said users are not limited to Diconix inks, but "we don't recommend special coated paper if they use our inks."

The printer works with both subscripts and superscripts, can print 6 or 8 line/in. and run full-size graphics, the vendor said.

The 300W can be used with a variety of print media, including cut sheet, fanfold, transparency and label stock, the firm said.

When a cut sheet is desired, the fanfold paper can be automatically pushed out of the way with the touch of a button without removing the fanfold paper from the tracks, explained Richard Ernst, senior administrator of merchandising programs. A second push of the button returns the fanfold paper to its original position.

The unit weighs 12 lbs. It will begin shipping in quantity shortly after Comdex, Garippo said, at a suggested retail price of $749.

Dbase III

FROM PAGE 37

Builders is the first major software vendor outside of a number of smaller concerns to provide add-on capabilities for the Dbase marketplace. One company providing a competing product is Concentric Data Systems, Inc.'s R&R Relational Report Writer.

Experienced users can use the package's windowing tool kit to build pop-up and pull-down windows for reporting applications. Size, placement and function of each window is determined by making selections from the Window Painter menu. Windows can be linked into full applications using the Focus Dialogue Manager macro language.

The macros enable developers to prompt the user for run-time parameters, invoke stored procedures and execute other applications without leaving the report-writing environment.

Focus Report Writer also provides easier linkage of multiple files than Dbase, according to Feldstein. The package enables users to relationally join up to 16 Dbase files using simple English commands.

Other report-writing and data-manipulation functions previously unavailable in a PC data base environment include automatic index usage, matrix report creation without programming and creation of extract files for Lotus Development Corp.'s 1-2-3.

Laptop

FROM PAGE 37

based in Deerfield, Ill., may resell the product to hospitals so that nurses and doctors can enter medical data into a computer at the patient's bedside, according to Ronald Bucheger, general manager of electronic medical systems.

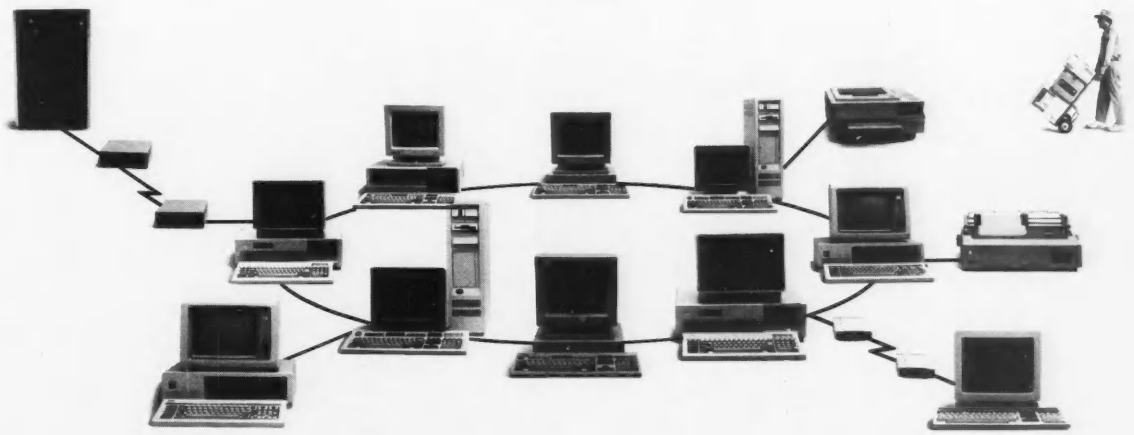
Nurses and doctors, who need to take notes while standing and are generally uncomfortable with computer keyboards, have responded favorably to demonstrations of the Linus system, Bucheger said. "There are a ton of applications" in the hospital industry and within Baxter Healthcare, he said.

Baxter Healthcare is a financial partner with Linus Technologies and has exclusive rights as distributor of the product in the health care industry, Bucheger said. Richard A. Mier, president and chief executive officer of Linus Technologies, said the firm plans to market a number of computer-based tools built around the proprietary technology.

The first product, the Linus microcomputer, will be sold directly to large user organizations and through value-added resellers (VAR), according to Arthur T. Rodbell, senior vice-president and cofounder of the company. He said the product is being tested at six VARs and user sites in preparation for its roll-out in first-quarter 1988.

Using software development tools provided by Linus Technologies, the VARs are expected to develop software applications that take advantage of the core technology. The technology was invented by Ralph Sklarew, a physicist and cofounder of the firm. He said Linus is ideal for organizations that need to capture signatures, record hand-drawn illustrations, calculate handwritten equations or record data while standing. Users can draw, enter text and issue commands directly onto the transparent, 8-by 5-in. flat LCD display, the vendor said. The unit weighs about 5½ lbs and has 640K bytes of CMOS static random-access memory.

Yet.



features like a built-in windowing capability and 8 host sessions per workstation. It even lets you simultaneously talk to different hosts with different protocols from anywhere on the LAN.

So, speed may not mean much now. But RabbitGATE can still mean everything to your LAN—today and tomorrow. Is it any wonder companies like CSX®, Aetna®, and Citicorp® depend on us for their connectivity needs? Or that OEMs like NEC® and IBM® work with us to develop connectivity solutions to their specifications? For a product evaluation, or for more information on all our products—including Coax, X.25, and LU6.2—write Rabbit Software Corporation, 7 Great Valley Parkway East, Malvern, PA 19355. Or call 1-800-RABBITC (in PA, 215-647-0440).

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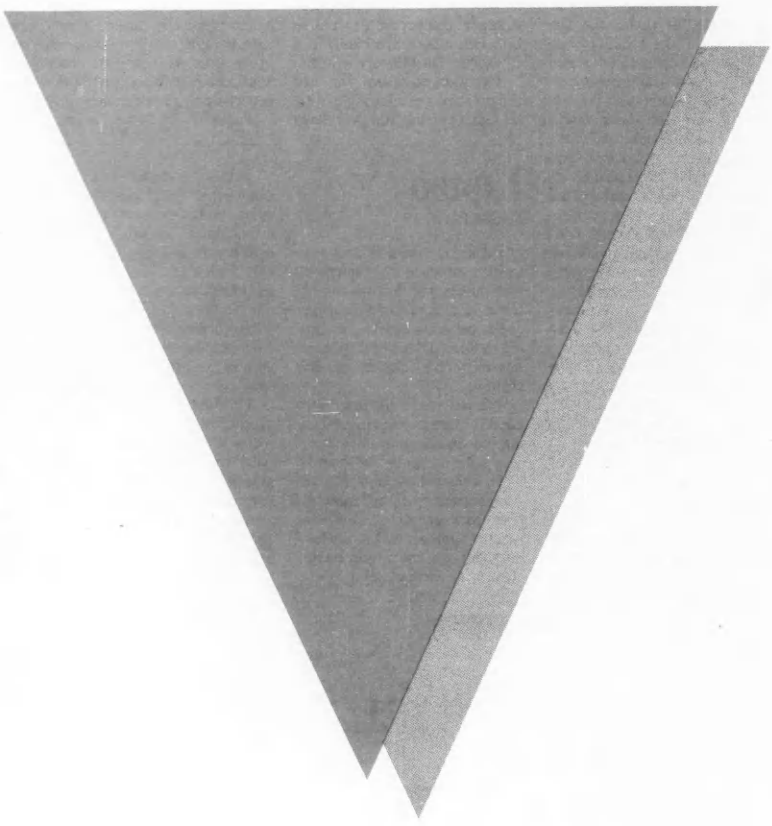

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NEW PRODUCTS

Systems

A line of four turnkey desktop publishing systems, called the **Excell Publisher**, has been announced by **Commax Technologies, Inc.**

The Excell 3800 integrates a 16-MHz Intel Corp. 80386-based computer with a 1.2M-byte floppy disk drive and 40M-byte hard disk with a 14-in. multiscan IBM Enhanced Graphics Adapter monitor and adapter card, a 300-by-300 dot/in. laser printer and Aldus Corp.'s Pagemaker or Xerox Corp.'s Ventura Publisher software. The Excell 3800S adds an image scanner with an optical-character reader and Z-Soft Corp.'s PC Paintbrush software package.

Also available are the Excell 2800 and 2800S, which use an Intel 80286-based computer running at 10 or 12 MHz.

Prices range from $5,195 to $8,195.

Commax Technologies, 721 Charcot Ave., San Jose, Calif. 95131. 408-435-5000.

Software applications packages

A software tool for programmers writing software that uses geometry has been announced by **Disk Software, Inc.**

Turbogeometry features more than 150 geometric routines said to be directly applicable to computer graphics. Included are routines that find the intersection of lines, polygons, circles, arcs and planes; determine the coefficients of the equations of lines, circles, arcs and planes; convert the coefficients of one equation to another; find the distance between points, lines, circles, arcs and planes; clip lines and polygons; decompose a concave polygon into a series of convex polygons; and perform two- and three-dimensional transformations.

Turbogeometry runs on IBM Personal Computers and compatibles. It costs $99.95.

Disk Software, Suite 487, 2116 E. Arapaho, Richardson, Texas 75081. 214-423-7288.

Plantrac Cadlink, a computer-aided design (CAD) product, has been added to the Plantrac project management product line by **Computerline.**

According to the vendor, the addition allows users to import bar charts and logic diagrams from Plantrac into their CAD files. Under Plantrac Cadlink, DFX-compatible files are created from Plantrac files. They can then be read by CAD programs.

Plantrac Cadlink costs $395.

Computerline, P.O. Box 308, 52 School St., Pembroke, Mass. 02359. 617-294-1111.

A digital logic simulation program for IBM Personal Computer compatibles and Apple Computer, Inc. Macintosh personal computers has been announced by **BV Engineering.**

After describing a logic circuit and sequence of binary input signals to the program, **LSP** computes the resulting binary output signals at any node of the circuit at the specified times. It contains built-in models for combination gates, sequential devices and tri-state devices.

Features include four definable states, synchronous and asynchronous inputs, full output control, compatibility with the vendor's PCplot and PDP for plotting and graphics and support for unlimited length keystroke macros as well as auto-execute and batch modes.

LSP costs $95.

BV Engineering, Suite 207, 2200 Business Way, Riverside, Calif. 92501. 714-781-0252.

A general-purpose data acquisition manager has been introduced by **Hewlett-Packard Co.** for use with its HP Vectra personal computer.

The software, called **HP DACQ/PC**, features subroutine tools that can be added to an HP Basic program. Subroutines are used to set up data bases as well as retrieve, store, analyze, display, print, plot and transmit data. They may be inserted anywhere in an HP Basic program.

HP DACQ/PC can be used with any HP-IB instrument. It manages data regardless of its source or destination. It also features built-in initialization and debugging routines.

HP 44459A DACQ/PC data-acquisition manager for HP Vectra PC on 3½- or 5¼-in. disks costs $1,480.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303. 800-367-4772.

A relational data base management system designed for the Apple Computer, Inc. Macintosh family of computers has been announced by **Nantucket Corp.**

The program, called **McMax**, includes an Ashton-Tate Dbase-compatible programming language and uses the same program and data files on both the Macintosh and the IBM Personal Computer.

Users can create customized alert and file boxes, cursor icons and context-sensitive Help screens.

Ten data base files of up to 63M bytes each can be open simultaneously. Records can store up to 32K bytes and contain up to 2,000 fields of up to 255 alphanumeric characters or 63 decimal numbers each.

McMax is priced at $295.

Nantucket, Suite 300, 12555 W. Jefferson Blvd., Los Angeles, Calif. 90066. 213-390-7923.

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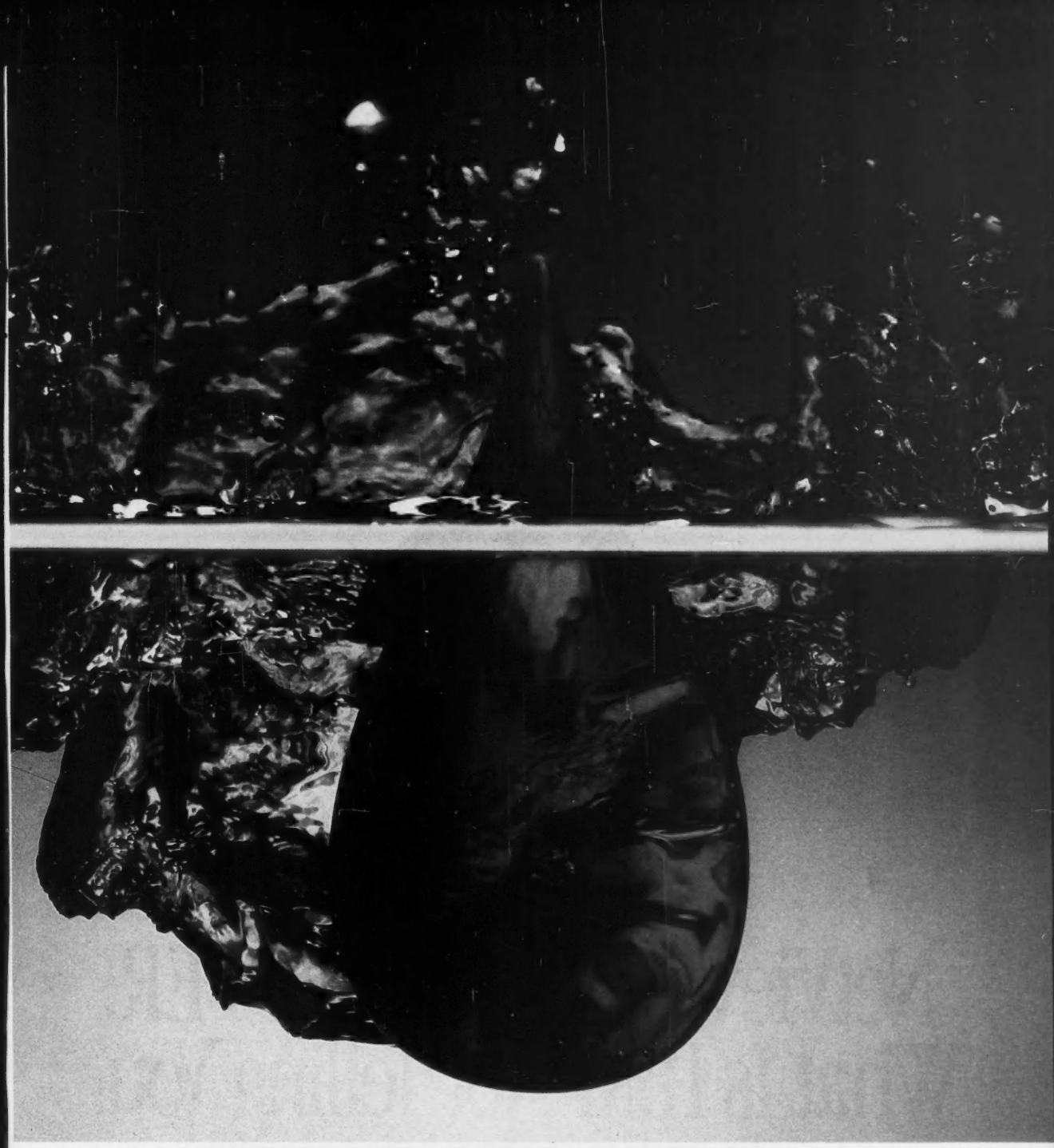

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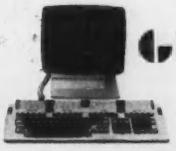

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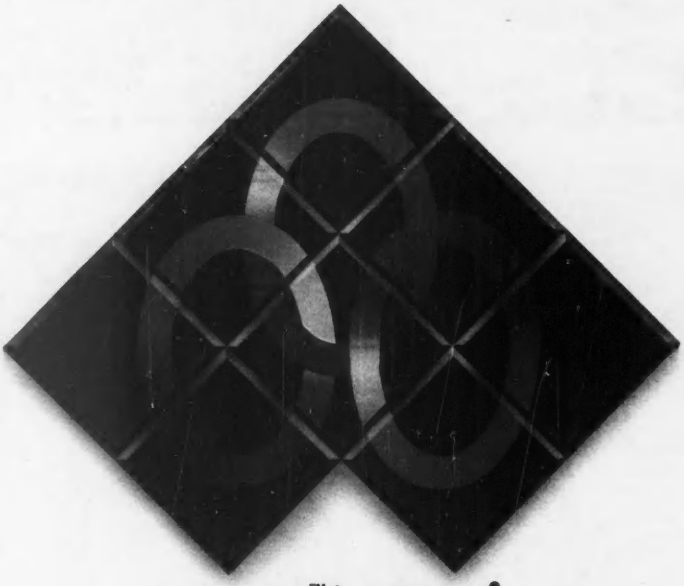

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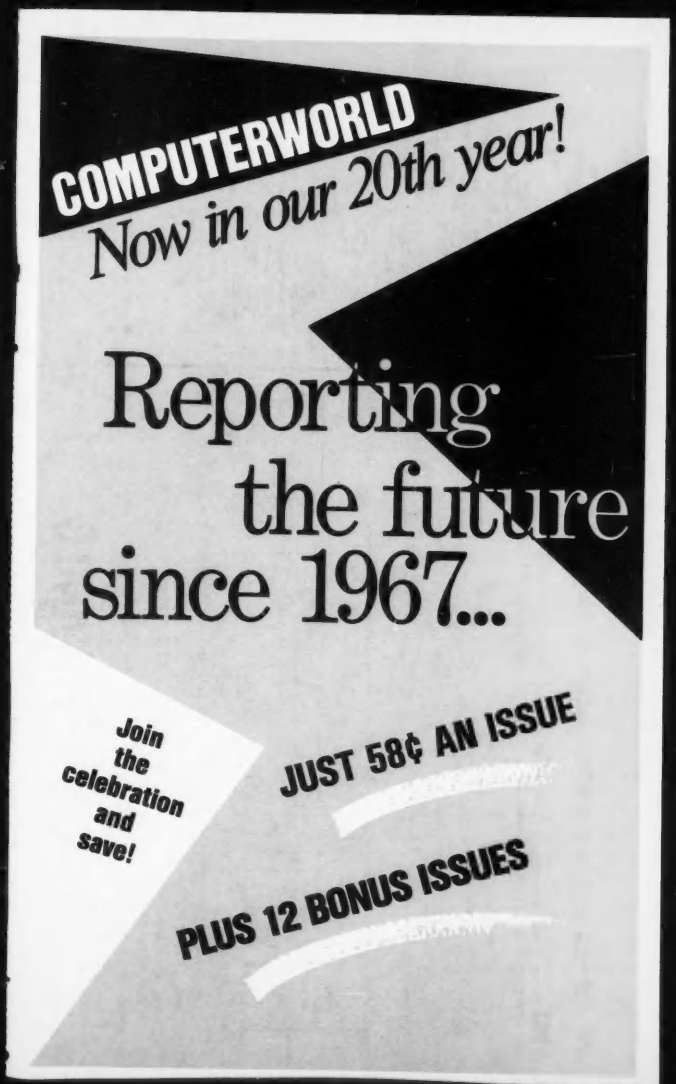
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35. Dir., Mgr., Supvr., OA/WP
38. Data Comm. Network/Systems Mgt.

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C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems
F. No Computer Involvement

338743-8

Software utilities

Gofer, an add-on utility designed for text search and insertion, has been announced by **Microlytics, Inc.**

Gofer is a pop-up random-access memory resident program for IBM Personal Computers, Personal System/2s and compatibles. According to the vendor, it operates without prior indexing, file conversion or key-wording. The program opens and searches through multiple files at rates up to 16K byte/sec.

Gofer is compatible with such word processors and utilities as Microsoft Corp. Microsoft Word, Micropro International, Inc.'s Wordstar and Wordstar 2000 and IBM Displaywrite III and IV. It also allows text to be searched and inserted on-line with electronic mail services.

Gofer costs $79.95.

Microlytics, 300 Main St., East Rochester, N.Y. 14445. 716-377-0130.

Development tools

An IBM DL/1 emulation product, called **Softbase** and said to run on IBM Personal Computers, has been announced by **Softsphere, Inc.**

Softbase resides in the system as an extension of DOS.

It supports a large implementation of the mainframe DL/1 component, including the DL/1 calls PCB, GU, GHU, GN, GHN, GNP, GHNP, ISRT, REPL, DLET and TERM, with full command-code support.

Support is also provided for multiple secondary indexes as well as sparse secondary indexes with user-written parsing routines.

Softbase supports Cobol, C, PL/1 and the personal computer assembly language. The product also includes an unload and reload utility, a data base query facility, a trace/debug facility and a conversion utility.

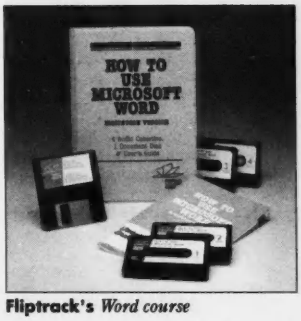
Softbase is priced at $450.

Softsphere, 51 Harrison Ave., Aurora, Ont., Canada. L4G 1E2. 416-841-0734.

Training

A self-study audio cassette-based course designed to instruct students in the use of Microsoft Corp.'s Word on Apple Computer, Inc. Macintosh computers has been introduced by **Fliptrack Learning Systems.**

The course, called **How to Use Microsoft Word**, is made up of four audio cassettes of about two hours each. It enables the student to work hands-on with Word to create, edit, print and merge-print documents. It includes instruction on such features as spell-checking, glossaries, outlining and style sheets.



Fliptrack's *Word course*

How to Use Microsoft Word costs $99. It comes with a document disk and an indexed User's Guide.

Fliptrack, 999 Main St., Glen Ellyn, Ill. 60137. 312-790-1117.

Data storage

The **Co-Star**, a data storage subsystem utilizing coprocessor technology, has been introduced by **DSC Nestar Systems**, a member of the Business Network Systems Group of DSC Communications Corp.

The hard disk and intelligent disk controller subsystem, available in both 80M- and 150M-byte capacities, includes an on-board 256K-byte memory and coprocessor, which is said to permit the CPU to run applications without interruption or memory overhead. The Co-Star's small computer systems interface features an internal 5¼-in. hard disk.

The Co-Star costs $1,495 for the 80M-byte model and $2,495 for the 150M-byte model.

DSC Nestar, 1345 Shorebird Way, Mountain View, Calif. 415-969-1777.

Printers/Plotters/ Peripherals

Wang Laboratories, Inc. has announced two printers for use on the Wang PC, APC and PC 200 or 300 series and on the Wang LM Shuttle Matrix model, for the VS family of minicomputers.

The **LDP8** laser printer uses a 300 by 300 dot-in. resolution. It has both parallel and serial interface connectors and is equipped with Hewlett-Packard Co.'s PCL printer command language. It costs $3,000.

The **DM50/300** nine-pin matrix printer features a correspondence-mode speed of 50 char./sec. at 12 pitch and up to 300 char./sec in 12-pitch draft mode. It costs $995.

The Wang LM Shuttle Matrix printer model LM400, costing $12,000, prints at speeds of up to 400 line/in.; the LM700, priced at $14,000, prints at up to 700 line/min.; and the LM900, costing $18,000, has a 900 line/min. ability.

Wang, One Industrial Ave., Lowell, Mass. 01851. 617-459-5000.

Board-level devices

Two IBM Video Graphics Array (VGA) cards designed for the IBM Personal System/2 Models 25 and 30 have been announced by **Paradise Systems, Inc.**

The cards, the **Paradise VGA Professional** and the **VGA Plus**, are based on the recently introduced **Paradise PVGA1** video controller chip. The VGA Plus card is for users who want a VGA eight-bit add-on board. The VGA Professional can display up to 1,024- by 768-pixel resolution in monochrome and 256 colors at VGA resolution.

The VGA Plus Card costs $399. The VGA Professional Card costs $599.

Paradise Systems, 99 S. Hill Drive, Brisbane, Calif. 94005. 415-468-7300.

Auxiliary equipment

The **EC-9 Keyboard/Mouse Extension** cable and the **EC-10 Color or Monochrome Monitor Extension** cable, designed for the IBM Personal System/2 Models 30, 50, 60 and 80, have been introduced by **Curtis Manufacturing Co.**

The EC-9 Keyboard/Mouse Extension cable is a fully shielded coiled cable that extends from 3 to 9 ft.

The EC-10 is a 6-ft fully shielded cable with high-density D connectors and 15 pins, male and female.

The cables are priced at $39.95 each.

Curtis, 305 Union St., Peterboro, N.H. 03458. 603-924-3821.

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DATA STREAM

Kathy Chin Leong

Benefiting from mergers

Anyone who has been scanning the papers lately knows that mergers and acquisitions in the networking industry have hit fever pitch.

Reading about another merger is as commonplace as reading the weather report. 3Com and Bridge Communications, NET and Comdesign, Excelan and Kinetics, DCA and Fox Research. And then there's Novell, which so far has snapped up Softcraft, Santa Clara Systems and CXI. There's just no telling when the takeovers will stop.

As users, that commotion will undoubtedly pose some inconveniences for you if it hasn't already. Your trusty on-site sales rep might be replaced with a novice whom you will have to train all over again. The volume discounts you have been enjoying may be jeoparized. The equipment you ordered may be discontinued with no technical support.

But seeing your favorite vendor swallowed up by another company need not wreak havoc on your network. In some cases, it can be a relief. For instance, if you had purchased a T1 multiplexer from a start-up company that was hitting the skids, chances are you'd be glad to hear that the company was acquired and that the product line would continue to be supported,

Continued on page 55

3Com to speed net server setup

Needs no manual operating system installation, taps power of 386

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — 3Com Corp. is expected today to unveil an Intel Corp. 80386-based multifunction network server said to feature both IBM Personal Computer AT-compatible slots and 3Com's 3+ network operating software.

Eliminating manual installation of the operating system and adding several software services reduces system setup from roughly 20 separate steps to three, 3Com claimed.

3Com also announced that when it delivers 3+Open, the next generation of its 3+ software incorporating Microsoft Corp.'s LAN Manager, 3Com will offer a 386 hardware option for its installed base of 3Server3 machines. The option reportedly will be available during the first half of 1988 and will cost approximately $3,000.

The 386-based 3+ Server Model 3S/400 and the Model 3S/200, which is an enhanced version of 3Com's current 3Server3 hardware, are part of the company's new line of 3+ server products for advanced and basic networks. All 3Com servers provide compatibility with Microsoft MS-DOS- and IBM Netbios-based applications.

The 3S/400 reportedly incorporates software written specifically to take advantage of the 386's processing speed. The software minimizes the time required to read information from the server's 150M-byte disk by working with the 3S/400's custom-designed disk controller to provide overlapped seeks with one-to-one interleave and zero latency in the disk subsystem, 3Com said.

Large firms targeted

The 3S/400 also provides a platform for future IBM OS/2-based software and is targeted at large corporations in which large work groups share data with depart-

Continued on page 60

CHANNEL-TO-T1 UPDATE

Extending mainframe access

BY JAMES BRYCE
SPECIAL TO CW

Distributed processing within the world of IBM mainframes and compatibles may suddenly be easier. Why? Because new channel-to-T1 couplers, marketed by at least eight vendors, including heavyweight IBM, are now available.

These products extend the traditional mainframe channel access limits of about 400 ft to those of high data rate T1 lines.

Users seeking to extend mainframe channel access have the following three options:

- Use channel extenders that allow connection of terminal equipment.
- Use channel couplers that provide connection to another mainframe's channel.
- Convert the channel to a local-area

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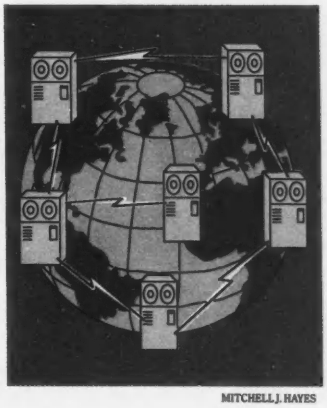

MITCHELL J. HAYES

Nynex and IBM plan ISDN trial

BY PATRICIA KEEFE
CW STAFF

WHITE PLAINS, N.Y. — IBM and Nynex Corp. last week announced plans to launch an Integrated Services Digital Network (ISDN) field trial in April 1988. This is the first ISDN trial involving IBM and a U.S. carrier.

The joint field trial represents an effort by Nynex and IBM to influence the development of international standards for ISDN network interfaces that will connect telecommunications networks to display terminals and other devices.

ISDN development is overseen by an international standards-setting process conducted by the International Telegraph and Telephone Consultative Committee and other international and national standards organizations. The trial is also designed to help determine the benefits of ISDN user-application programs.

Plans call for the field trial to specifically test network interfaces linking two Nynex locations using a central office switch located in Nynex's Network Services Development Center in

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- Dialcom, Western Union add X.400 services. Page 60.
- Standard Microsystems offers Arcnet product line. Page 66.

Portables making Hertz's job a Sunday drive

BY KATHY CHIN LEONG
CW STAFF

NEW YORK — Portable hand-held computers are making life easier and faster for agents and customers of car rental giant The Hertz Corp.

In an industry in which a quick response is synonymous with good business, Hertz customers will soon be able to forego the hassle of going to the ticket counter to return cars. Instead, they will be able to obtain the final receipt directly from the parking lot attendant.

The goal of this new service, dubbed "Hertz Instant Return," is to cultivate a loyal customer base and win over clients tired of waiting in line.

In a gradual rollout beginning with airports in San Francisco and Los Angeles, Hertz is providing attendants with custom hand-held computers, developed by Clancy Systems International, Inc., located in Denver.

But Hertz cannot lay claim to the idea. Late last year, chief competitor Avis Rent-A-Car Systems, Inc., headquartered in Garden City, N.Y., began beta-testing a similar system with customers on its airport lots. Avis made a big splash, featuring its "Roving Rapid Return" system in full-page ads in various business publications.

Leapfrog

In fact, in the race toward automation, the two car-rental empires often take turns moving a step ahead of the other or improving on what the other introduced first.

In this particular case, Hertz got the jump on Avis by using portable thermal printers along with the hand-held computers.

The Hertz hand-held computer can hold up to 2M bytes of memory. The system features a detached thermal printer, carried by an attendant. The computer and printer together weigh less than 2 lbs, according to Hertz officials.

The idea behind Hertz Instant Return is, well, speed. After the renter pulls up to a Hertz parking stall, an agent keys in the essential data on his computer. The customer gets a listing of the amount owed, the date, the mileage and the make of car. Since the receipt is being generated as the user enters the information, the slip spits out in less than a minute, claimed Bob Evans, Hertz manager of customer services and operations development.

Conversely, the Avis system uses the same hardware but is only now beginning to use the portable thermal printers. Today, Avis customers must go inside the Avis office to pick up their receipt, Hertz claimed. Unlike the Hertz setup, the Avis hand-held computer is linked to a mainframe in Garden City via FM radio transmission. Through the computer's FM radio transmitter, the Avis rental station receives data signals and transmits those to a local IBM Personal System/2 Model 30. In turn, the Model 30 uploads data

Continued on page 60

BIT BLAST

Timeplex adds service; Paradyne, Unisys team

Timeplex, Inc. in Woodcliff Lake, N.J., recently announced its Full Service Maintenance Programs, which come standard with seven-day-a-week, 24-hour protection of voice/data communications networks. Standard features offered include network problem isolation, installation of engineering changes and flexible installation hours for network upgrades.

There are three levels of service: A Level is fully comprehensive, providing seven-day-a-week, 24-hour coverage and enhanced support features such as installation of engineering changes or expansion modules at no additional cost; B Level is a modified version of the A Level, limited to between Monday and Friday, 8 a.m. to 5 p.m.; and C Level provides basic maintenance coverage only.

Paradyne Corp. in Largo, Fla., and **Unisys Corp.** in Blue Bell, Pa., recently announced two agreements: a project to jointly develop an advanced network management system and a deal allowing Unisys to incorporate Paradyne modems, multiplexers and network management products into custom networks to be sold under the Unisys Alliance program.

Under the first agreement, Unisys is scheduled to supply personnel and funding. Both vendors will have rights to the system and to any future enhancements to that product.

Ungermann-Bass, Inc. has signed a Memorandum of Understanding with the National Security Agency to develop a special version of its Net/One local-area network (LAN) that will meet requirements protecting classified U.S. government information. It reportedly will allow users working in classified government facilities to securely exchange information over conventional LAN media.

American Airlines recently announced plans to implement Lenexa, Kan.-based **Consumer Software, Inc.'s** The Network Courier electronic-mail package on American's Sabre Travel Information Network. Under the terms of the agreement, The Network Courier will be installed on more than 12,000 local-area networks utilizing IBM Personal System/2 workstations during the next four years. Later this year, Consumer Software said, it will release links to Digital Equipment Corp.'s All-In-1 and MCI Telecommunications Corp.'s public E-mail system as well as a Microsoft Corp. Windows-compatible version of its mail package.

Telco Systems, Inc. in Norwood, Mass., and **Fiberlan, Inc.**, a Bellsouth/Siecor company, have announced an agreement for a high-speed ring product based on Telco's 560M bit/sec. fiber-optic terminal equipment, called M560. Fiberlan will gain access to Telco's transmission equipment software technology. In turn, it will allow Telco to market its M560 system utilizing Fiberlan's patented Ring System software.

Tandem Computers, Inc. in Cupertino, Calif., recently announced it has validated Santa Clara, Calif.-based 3Com Corp.'s 3+ network operating software and Etherlink network adpaters for use with Tandem's Multilan products, used to link local-area networks (LAN) to Tandem systems. Tandem has already validated IBM's Token-Ring (Models 1 and 2) and PC Network, Sytek Corp.'s 6110 and 6120 LANs and Ungermann-Bass, Inc.'s PC-NIU and NIU-PC adapters.

Micom-Interlan in Boxboro, Mass., recently announced its largest OEM contract ever, a multimillion-dollar, two-year agreement with **Philips Information Systems Ltd.** in Montreal, on behalf of the Philips Telecommunication and Data Systems Division and all Philips' affiliates worldwide. Micom-Interlan will supply intelligent and data link Ethernet and token-ring controllers for integration into the Philips line of personal computer-based products. Volume product shipment of the resulting products will begin in first-quarter 1988.

Joiner Associates, Inc. in Madison, Wis., recently added support for IBM's Systems Network Architecture (SNA) to its Jnet software. Jnet reportedly allows Digital Equipment Corp. VAXs to communicate with IBM's bisynchronous networking environment. The Jnet-S SNA Option will run in conjunction with either DEC's Decnet SNA Gateway or VMS/SNA software.

OST, Inc., a wholly owned subsidiary of OST SA in Rennes, France, has announced plans to expand into the U.S. market. OST, a supplier of telecommunications technology such as wide-area networking and Integrated Services Digital Network technology products, has established U.S. headquarters in Bohemia, N.Y., and a technical support center in Washington, D.C.

OST also announced its U.S. management team: Barry Oliver, president: Ben Khowong, vice-president of finance; John Pugh, director of marketing and sales support; Gene Szlatenyi, director of support services; and Todd Krautkremer, national sales manager.

Ideal Working Conditions

If you're looking for a high-speed laser printer that can easily handle as many as 25,000 pages a month, the new Toshiba PageLaser12® is the machine for you.

It thrives in any high-volume office environment. Whether it consists of a productive single user, or a network of multiple users sharing the workload.

PageLaser12's extended product life might help to explain its hard-work mentality. At up to 1.2 million pages, it's three times more durable than other laser printers.

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That's 500 sheets more than most other laser printers.

But here's the best part. With three paper feeders, you can now print multiple paper types and sizes automatically. Letter, legal, letterhead, even labels can be accessed with no physical change.

What's more, our optional proprietary envelope feeder lets you print large quantities of envelopes without constantly banging away on your office typewriter.

You can also use the same font style that appears on your letters to create a

Benefiting

CONTINUED FROM PAGE 53

thanks to the new cash-rich parent.

The fact is, now is the time for savvy users to leverage these buy-outs by putting heavy pressure on suppliers to get what they want.

One user I spoke to recently said he makes a point to cover himself each time he signs a contract. At the bottom of each agreement, the user inserts a boilerplate clause that says something like: "The above terms will remain intact in the event of any change in the company's structure, product line or strategy." That's ironclad protection.

Other users make a point to rally together with like customers to make sure their new suppliers don't take advantage of the situation. For example, when Northern Telecom sold its West Coast sales unit to Pactel Infosystems, members of the Northern Telecom SL-1 users group got together with Northern Telecom officials to air their concerns.

Users really can get more

While we all know that the goal of a merger is for the combined company to grow bigger and more profitable faster, there is a grain of truth to the line often echoed: "We want to provide more for our users."

Vendors in the network industry like to marry companies that will complement their product lines. Mergers consolidate the industry, clearing up confusion for network users faced both with a jumble of actual and would-be standards and with an equally bewildering array of potential suppliers.

At the same time, mergers will give certain products a new lease on life. The product you couldn't buy in Richardson, Texas, for example, is now available to you because the vendor was acquired by a company with an incredible nationwide sales force.

Studying vendor alliances can give you a break, also. Knowing that 3Com has had a joint-development agreement with DEC and that Bridge builds high-end communications gear, users of 3Com equipment are now asking 3Com to develop more products that link 3Com networks to the DEC Ethernet environment.

Or, users of Transmission Control Protocol/Internet Protocol products who want to attach Apple Macintoshes to their networks can look with some expectations to Excelan's merger with Kinetics and plan accordingly. Likewise, if you have a relationship with a vendor who has several joint alliances, you can strongly suggest to your network supplier that it create the appropriate interfaces to link your dissimiliar computing environments.

The point is that you don't have to feel as though you are at a disadvantage when it comes to vendor acquisitions. Nor should you have to put up with service delays or postponed product shipments. Remember — the result of merger mania is supposed to put you, the user, in the front seat, not the back. So take charge. Get out your strategic map, point the vehicle in the direction you want to go, and get going.

Chin Leong is *Computerworld*'s West Coast bureau manager.

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But don't think for a second all these bells and whistles slow down performance. At 12 pages per minute, PageLaser12 is up to 50% faster than many other laser printers.

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IBM PCs gain ISDN access

BY PATRICIA KEEFE
CW STAFF

EATONTOWN, N.J. — Teleos Communications, Inc., a supplier of T1 wideband and Integrated Services Digital Network (ISDN) access products and development tools, has introduced ISDN access and applications development systems for IBM Personal Computers and compatibles.

The B100PC ISDN Communications Coprocessor board reportedly provides PC-compatible systems with a CCITT-compliant basic rate interface (2B+D) to ISDN 64K bit/sec. voice and data services. The B100PC is also the heart of Teleos's C software-based Access Development System for ISDN applications development.

Access addresses two critical issues in the growth of ISDN, Teleos claimed. It lets subscribers use their existing base of computing equipment to access the emerging range of ISDN services and also provides a development system said to enable users to build communications applications using ISDN, according to Chairman Charlie Bass.

For example, the B100PC coprocessor can be used to implement a local-area network (LAN) bridge or gateway over ISDN circuits. The Teleos system reportedly provides all the necessary software tools to resolve signaling and protocol differences between the LAN and switched network.

The required bridge or gateway software would run in the B100PC board, relieving the host processor from protocol conversion, signaling and communications management tasks.

The B100PC also performs all ISDN functions, leaving the PC free to run applications programs. Voice capabilities are provided through a standard Touch-Tone telephone linked to an RJ11 modular jack on the Teleos board.

The B100PC board costs $1,795. The accompanying software, for either an AT&T or a Seimens AG switch, costs $200. The Access software costs $4,750.

Mainframe

FROM PAGE 53

network (LAN) protocol such as IEEE 802.3 (see story page 59).

This investigation concentrates on channel couplers that connect mainframes.

With a T1 connection and channel equipment, terminal and printer communication is handled, as usual, over slower lines. The T1 link enables the local mainframe to exchange data and use remote machine disks attached to a remote host almost as if they were locally attached.

While it's true that T1 speeds of 1.554M bit/sec. are still significantly slower than channel speeds of 3M byte/sec. (soon to be increased by IBM to 4.5M byte/sec.), at least one vendor today offers a T3 connection, at 45M bit/sec., that is more than adequate to connect mainframes anywhere T3 is available and provide data rates at full channel speed.

With such products, it is necessary only to compensate for transmission delays because of distance, not line bandwidth.

All vendors claim their products are transparent to VTAM. Earlier versions of VTAM presented problems to designers of channel extenders and couplers because of time-outs and block sizes. But VTAM 3.1 has overcome many of these problems.

The vendors and the products include the following:

IBM's 3737. This remote channel-to-channel unit requires no host modification or software. Users simply attach it to the channel and to a T1 interface through a standard connection. A manual switch is provided to select channels and is controlled via customer-supplied IBM Personal Computers or PC ATs. 512K bytes of memory for operation and buffering are provided.

Host communication is supported by the VTAM channel-to-channel program. The 3737 is transparent to the host as it communicates with a remote host. Distances are unlimited. A typical point-to-point connection of two mainframes would cost $144,000 plus $1,390 per month for software.

Data Switch Corp.'s Channelnet Model 9055 Channel Extension System. This product is able to place the full channel data rate of 3M byte/sec. on a T3 line. Modification of host software is not required.

Currently, the price of this speed and use of VTAM alone results in a limited range. According to John DeSantis, Data Switch's vice-president of marketing, users can expect to reach about 60 miles when running the Model 9055 under recent versions of VTAM. Beyond that, the IBM software times out. However, VTAM 3.1 might overcome the time-out limitation.

Data Switch's 9055 is produced only for the high-speed T3. Connections may be either host-to-host or host-to-many different devices. Disk drives are the only devices unable to attach to the remote 9055 without a local host. Data Switch prices the 9055 in link pairs with a systems controller. The cost ranges from $100,000 to $180,000 to link two typical mainframes.

Mary McCaffrey, a vice-president of research for C.J. Lawrence, a New York-based stock brokerage house, says the Data Switch 9055 may be ahead of its time in using T3. The service is still rather expensive and not widely available.

Network Systems Corp.'s Remote Device Support (RDS). Network Systems can connect computers from diverse vendors physically and furnish software to enable exchange of data. It offers two approaches to mainframe-to-mainframe connection over T1.

When the only requirement is very high-speed data transfer, Network Systems' Netex software and appropriate hardware may be used. Data transfer might approach more than 90% of T1 speed.

Network Systems' RDS provides the same service as IBM's 3737 — host channel-to-host channel connection transparent to VTAM. But the RDS also emulates more than one subchannel session at the same time, up to a total of 256. The 3737 is limited to only one subchannel session. Operation is full-duplex up to a rate of 2M bit/sec.; the maximum rate is 44M bit/sec. simplex. Multiple and alternate paths are supported on the T1 side, and routing may be changed automatically.

RDS may also be used for host-to-peripheral device connection.

An appropriate model for host-to-host connection is RDS-H — combination host and link modules — and associated software. Connecting two typical hosts costs $90,000 for hardware plus $970 per month for software.

Paradyne, Inc.'s XL Express. This package is used in conjunction with Paradyne's Pixnet XL channel extension hardware. It can handle the 2.048M bit/sec. European/International version of T1 as well as 1.544M bit/sec. T1. VTAM and other environments are supported. XL Express runs on the host and overcomes some of VTAM's limits, such as the need for an acknowledgment from the remote.

According to Ed Beck, Paradyne's product manager of networking systems, channel-to-channel transfers may be completed using VTAM and the Pixnet XL hardware without XL Express software if the performance (about 800K bit/sec. of transfer rate using VTAM-to-VTAM) is acceptable.

To boost performance, the company provides the XL Express software for use with Pixnet XL. The hardware can support up to eight T1 lines by adding cards, but the aggregate throughput cannot exceed 2.048M bit/sec.

Paradyne supports more than VTAM. It can connect JES-to-JES as well as IBM Remote Spooling Communications System (RSCS)-to-RSCS and JES-to-RSCS. Facilities for bulk file transfer to a number of other environments, including Microsoft Corp.'s MS-DOS and IBM's PC-DOS, are available. The hardware contains up to 3.5M bytes of memory. Paradyne also supports host-to-device connection.

Netview, IBM's universal network management system, will be recognized on both products. While the 3737 requires T1, Paradyne's product may also use up to eight 56K bit/sec. digital lines or 16 19.2K bit/sec. analog lines.

Pixnet XL costs $45,000 per CPU. Linking two hypothetical mainframes would entail a cost of $90,000 for the hardware. XL Express software is expected to cost $10,000 per CPU.

NTX Communications Corp.'s NTX 3800 Communications Processor Model 2. This package supports up to two local hosts and combines the traffic from each simultaneously on a demand basis. All models have internal redundancy. Three models offer up to four outgoing lines at either 512K, 1M or 1.544M bit/sec. A fourth model offers one line out at 6M bit/sec.

Two channels from two local hosts may be transmitted on a single T1 line to the destination.

The NTX 3800 does not try to emulate a local channel extender or coupler. Instead, it has custom software designed in accordance with IBM's Systems Network Architecture (SNA) to reach nearly 90% efficiency in use of T1 connections.

The 3800 adheres to SNA and has implemented Netview. NTX proprietary software runs on the host. A typical point-to-point link of two mainframes would be $150,000 plus $3,100 per month in software.

Computer Network Technology's (CNT) Channelink 5100/R. This product offers multiple channels and T1 and is transparent to SNA needing no special host software.

CNT President C. McKenzie Lewis emphasizes that the 5100/R is not a channel extender. Rather, it is a channel-to-channel coupler that emulates an IBM 3088 channel switch. The 3088 is essentially limited to computer room installations; the 5100/R is able to communicate anywhere a T1 line can reach.

Through the addition of plug-in circuit cards, the 5100/R can link eight or more channels.

Alternate routing is offered by the 5100/R. In the event of a T1 failure, another connection may be established automatically. The 5100/R uses a 2M- to 10M-byte buffer to store host communications; this results in about 95% utilization of the T1. CNT has priced the 5100/R at $40,000. A link of two hosts would typically cost $80,000.

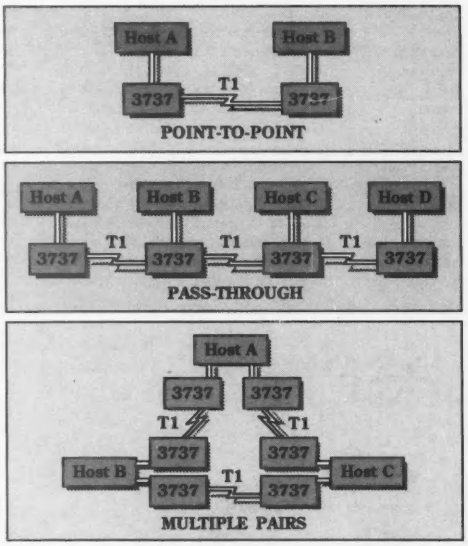
According to Bart Stuck, a vice-president with Probe Research, Inc., "The 5100/R may be the current leader in this new field. CNT's strength lies in its large buffer, multiple T1 connections and support for non-IBM protocols; the 3737 requires VTAM." Stuck also notes that the "most surprising thing about the IBM equipment is its lack of ability to network."

Computer Communica-

Continued on page 59

Topologies for IBM's 3737

Remote channel-to-channel unit



INFORMATION PROVIDED BY IBM
CW CHART

Unlimited possibilities

The significance of channel-to-T1 products are considerable. Consider the following scenarios:

- A truly distributed data base system spread throughout the country. Different portions of the data base reside on different hosts' disk drives. However, through use of T1 or faster channel couplers, all hosts have quick access to all the information.
- Instantaneous data backup using an iron mountain approach. No longer does the courier show up everyday to take out tapes, physically transporting them to a secure site, repeating the procedure day in and day out. No longer is backup restricted to occasional dumps of small, selected portions of a data base over slow, terminal-type communications at a few tens of kilobits. Instead, large amounts of information may be dumped minute-by-minute to a secure remote site mirroring all operations.
- Dual center transaction processing. With appropriate programming, each transaction will be maintained in two or more hosts for fully mirrored operation with negligible delays.
- Darkened data center. All the primary mainframe equipment is placed in a remote, secure and darkened facility removed from the central business district or manufacturing area. Minimum personnel would be needed for such a facility and high-speed T1 lines connect it to all computing and terminal equipment at headquarters.
- Local-area network (LAN) integration. Channel-to-channel attachment affords the prospect of using host computers as gateways to LANs retaining hierarchical control within the mainframe system. How can this happen? Via channel-to-LAN equipment.

JAMES BRYCE

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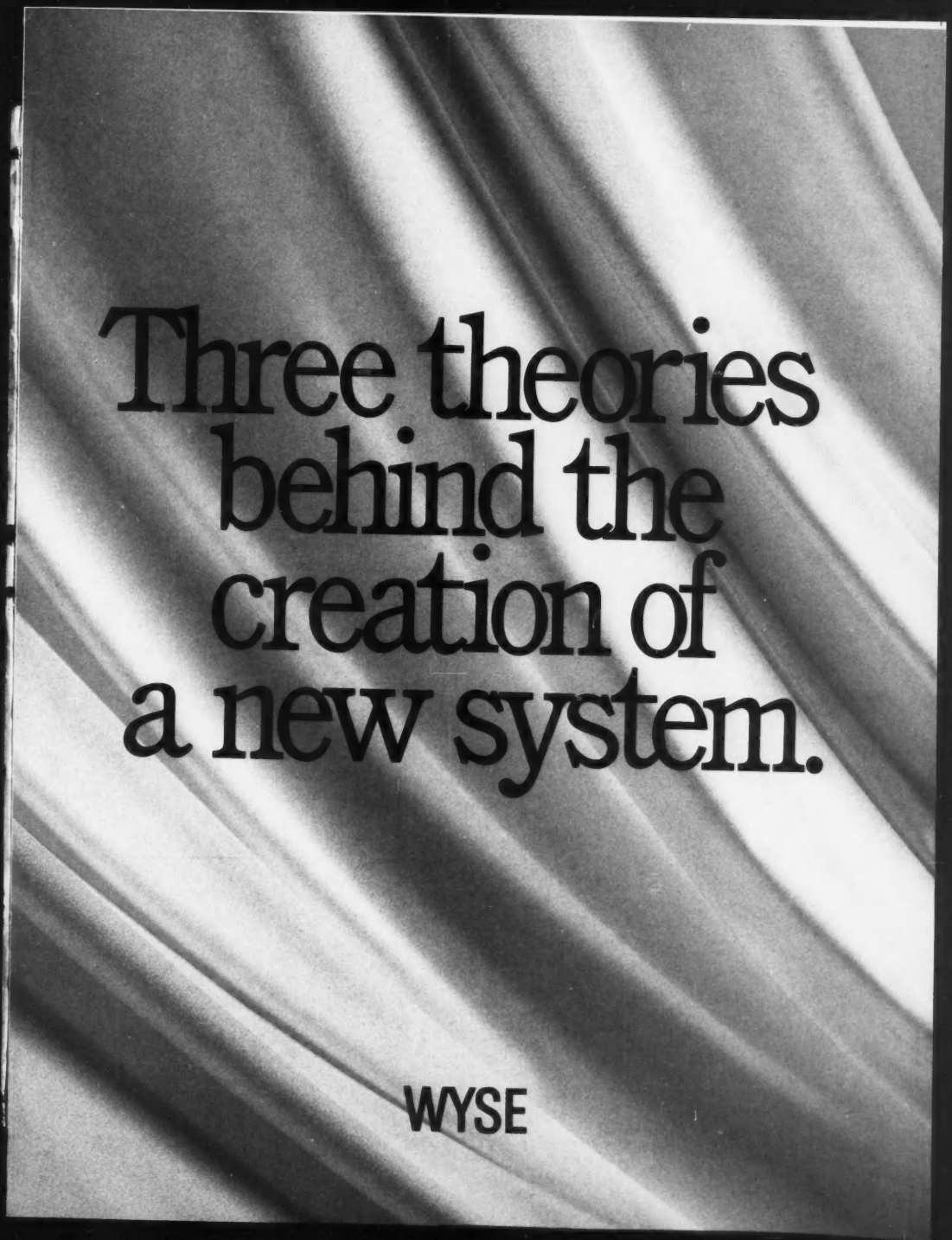
Three theories
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WYSE

The Big Ban

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In the beginning, there was power.

When Wyse engineers set out to create a new personal computer family, their objective was not merely to design a new system, but to design a new *design*. Criterion one was power with total compatibility: higher performance for industry standard operating systems and applications. Today's and tomorrow's.

Introducing SystemWyse,™ a comprehensive system for creating solutions. At its core are four new Wyse computers which set higher standards of performance for every level of PC user.

At the top, the new WYSEpc 386 has one of the highest benchmark ratings yet for a personal computer. Our unique design harnesses the 16 MHz 80386 microprocessor to achieve exceptional memory speed as well as processing speed. The result is a zero wait state system for high speed processing on multiple operating systems, such as MS-DOS,® OS/2,™ and Xenix.® As an engineering work station, a high power spreadsheet processor, a multi-user system, or a network server, it is a system to satisfy the insatiable.

The same Wyse design ingenuity maximizes the effective power of the 80286 microprocessor as well. In our 8 MHz general purpose 286, our 12.5 MHz professional desktop system, and our 12.5 MHz zero wait state high performance system. At Wyse, overachievement just seems to run in the family.

The WYSEpc 386 driving our VGA color monitor. WyseWindow™ LCD provides system status and activity readout.

WYSE

We make it better, or we just don't make it.

The Theory

Survival of the system demands the ability to adapt to an ever-changing environment. Traditional PC design applied to most systems today virtually guarantees their extinction sooner rather than later.

It occurred to the Wyse engineering team that, with rapid change the only true constant, the intrinsic ability to adapt readily to new technology was essential in the ideal PC design.

For example, by incorporating all active functions on plug-in cards, we could make upgrading or reconfiguring our computers literally a snap.

From this simple concept emerged the most practical PC design of the '80's —and 90's: the Modular Systems Architecture™ we developed for SystemWyse.

This new design gives PC purchasers, at last, a means to protect their investment against Dreaded Obsolescence. The CPU itself is a plug-in card. So, for example, you can upgrade our general purpose 8 MHz model to a 12.5 MHz high performance 286 machine—or even a 16 MHz 386—as easily as you'd add a graphics board to a traditional system. And when more powerful microprocessors are available, you'll even be able to boost the power of our top-of-the-line WYSEpc 386.

To achieve such flexibility, Wyse applied mini-computer design concepts to the internal architecture of our PCs. Our new passive back plane accommodates as many as 10 plug-in cards that perform all necessary functions, and then some.

It's this easy to upgrade CPUs—and boost the power—of a SystemWyse PC.

# of Evolution.

With total interchangeability. Wyse already makes available a wide array of graphics, memory expansion, and interface modules.

Our design also increases ease of repair and accommodates customized configurations *ad,* virtually, *infinitum.*

In a world in which survival belongs to the fittest, the only true survivors are those with the capability to remain fittest, longest. This is a theory applied with great practicality in SystemWyse.

Three SystemWyse graphics solutions: our 8 MHz desktop with a Wyse VGA monitor; our 12.5 MHz professional desktop and VGA color monitor; and our 12.5 MHz, zero wait state system driving the WY-700 hi-res graphics display.

WYSE

We make it better, or we just don't make it.

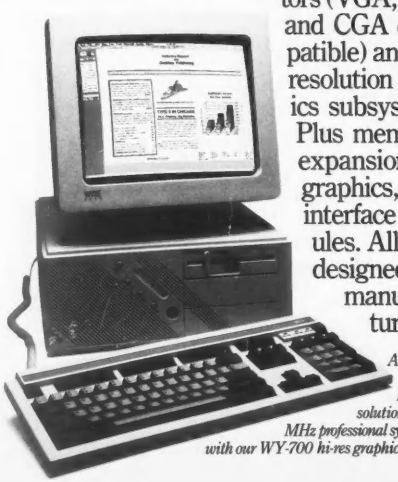
The Theory

It all works together.

Most of all, SystemWyse is a system for creating solutions. Uniquely integrated solutions that range from desktop publishing installations and powerful CAD/CAE workstations, to 16-node multi-user systems. All are based on industry standard operating systems, with over 1000 *tested* applications available.

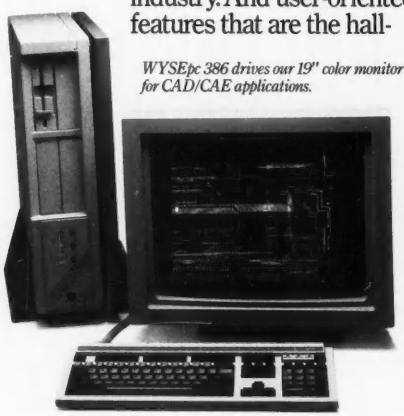
At the heart of SystemWyse are our Modular Systems Architecture computers. They're the most powerful PC family in the business. And, with more possible configurations, the most flexible.

But SystemWyse also encompasses an entire catalog of compatible, superbly designed peripherals. Including one of the industry's most popular lines of computer terminals. Color and monochrome monitors (VGA, EGA and CGA compatible) and high resolution graphics subsystems. Plus memory expansion, graphics, and interface modules. All are designed and manufactured by Wyse to link effortlessly, and work together in singular harmony.



A SystemWyse Desktop Publishing solution: our 12.5 MHz professional system coupled with our WY-700 hi-res graphics subsystem.

It's all driven by a unified design vision. That's why SystemWyse has a look and feel that's consistent throughout. Computers and terminals with identical screens and keyboards. Styling that has set a new standard for the industry. And user-oriented features that are the hallmark of Wyse design.



WYSEpc 386 drives our 19" color monitor for CAD/CAE applications.

Such as the advanced ergonomics. The crisp characters and high resolution screens of our terminals. The clarity and vivid colors that distinguish our monitors. The built-in help facility and simplified set-up menus of our systems.

Standing behind our ability to deliver on the promise of SystemWyse is our unique manufacturing capability. As one of the industry's most vertically integrated producers, we make all our own

# of Relativity.

products. And we make virtually everything from the ground up. While most companies use sub-assemblies purchased from someone else, we gain infinitely greater manufacturing control by beginning with components.

The result is a means to create solutions of manifestly superior quality and value. Solutions that are at once both elegant, yet relatively easy to construct. Solutions that seem custom designed for each specific application. We call them, simply, "SystemWyse solutions."

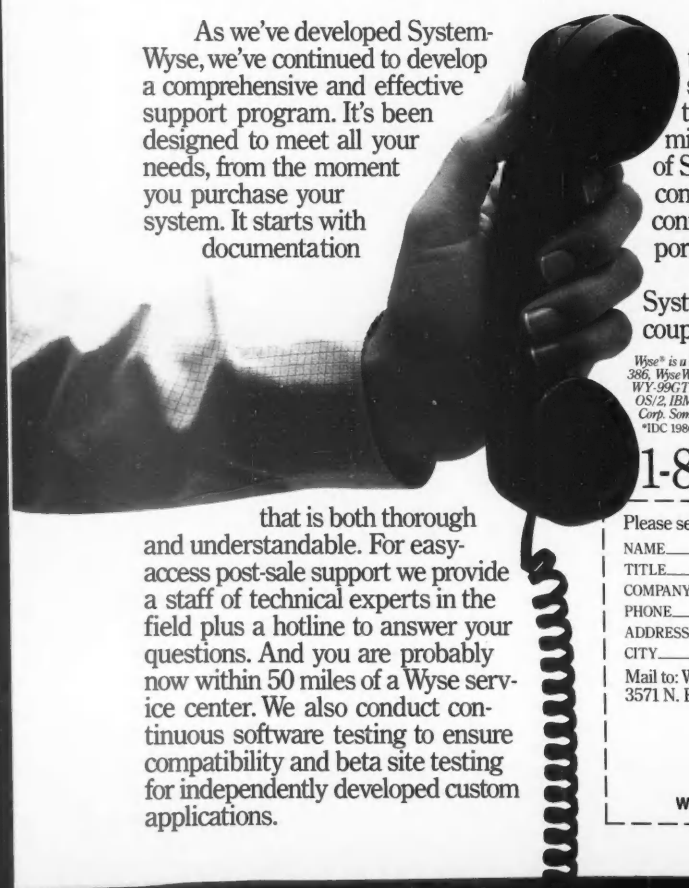
A WYSEpc 386 powered multi-user system, with our WY-60 alphanumeric and WY-99GT graphics terminals as work stations. All peripherals link to the system with simple telephone-type connectors.

WYSE

We make it better, or we just don't make it.

The conclusive support for our theories.

As we've developed SystemWyse, we've continued to develop a comprehensive and effective support program. It's been designed to meet all your needs, from the moment you purchase your system. It starts with documentation



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Mainframe

CONTINUED FROM PAGE 56

tions, Inc.'s 8400 Communications Processor. This processor can transfer data between two or more IBM hosts at T1 speeds. It has an aggregate throughput of 6.3M bit/sec. Redundancy may be installed via optional modules. Two identical systems can be contained in a cabinet with redundant power supplies and modem switching.

Version 1.0 supports four T1 links to our host channels. The four links can be active at any time with fixed point-to-point routing from one source to one destination. No host software changes are necessary.

Version 1.2 emulates a channel-to-channel adapter and supports VTAM. Its other features are like those of Version 1.0 Link transmission is half-duplex.

Version 2.0 supports both pre-SNA and VTAM access methods. It can support eight T1 links and four hosts and allows for dynamic subchannel configuration for multiple source/destination routing. Link transmission is full-duplex. Aggregate throughput is 25.2M bit/sec. SNA use allows the use of multiple sources or destinations.

A Version 1.2 CCI 8400 configured for a single T1 line is $55,965. Two systems used to connect point-to-point mainframes would cost $111,930. The necessary software is bundled with the price; no special software is used on the host.

KMW Systems Corp.'s Auscom 8911. This product can emulate a number of devices that are attached to a channel, including emulation of the 3088 channel-to-channel coupler. It is transparent to VTAM and is programmed to respond with a channel end whenever it gets the information from the host. If the host sends a block, the 8911 sends a channel end from that block. It then performs a protocol conversion and requisite timing to place the information on T1.

The 8911 is a flexible piece of equipment. In addition to channel-to-T1 connection, it can perform channel-to-IEEE 802.3, 802.5 and Proteon Pronet 80 connection. The 8911 can manage up to 12 T1 lines and divide its total backplane bandwidth of 8M bit/sec. dynamically among them.

Configured for the hypothetical connection of two hosts over T1, the 8911 costs $30,620. Two would cost $61,240.

For those brave enough to design their own software, Gerard Myers, a KMW product support engineer, says the 8911 hardware can be sold as a unit without the software.

The equipment described above appears destined to distribute mainframe computing. An intriguing prospect for its use is integration of currently evolving LANs into a larger context.

Channel connection is one way to provide gateways among such networks while still preserving a mainframe hierarchical communications structure and centralized control.

But beware — this application may have some drawbacks. As Paradyne's Beck points out, "You could utilize a combination of VTAM pass-through and LAN connection as a gateway, but this would put a significant load on the host. We look at bottom line performance; there is a question of the amount of impact the gateway function will have on performance."

Bryce is a consultant and writer based in Austin, Texas.

The LAN connection

Channels can also be extended by conversion to a local-area network (LAN) standard such as IEEE 802.3 Ethernet, thereby gaining all the advantages available under that particular standard.

Products that connect to 802.3 LANs include the following:

- The Sparticus K200 Ethernet Controller and KNET Network System offered by Fibronics International, Inc. in Hyannis, Mass. Transmission Control Protocol/Internet Protocol (TCP/IP) with mail and simple file transfer is available.
- The Auscom 8911, designed for 802.3 connection, offered by KMW Systems Corp. in Austin, Texas.
- The SNA Network Server Model M2030 from Mitek Systems Corp. in Carrollton, Texas. Also Mitek's M2130, which connects to the serial port of the mainframe communications controller when direct connection to the channel is not possible.
- The Fastpath family of connectivity platforms, including the Model 9750E from Intel Corp. in Phoenix, Ariz. Digital Equipment Corp. VAX, Manufacturing Automation Protocol and asynchronous connections are available.

All of those products reportedly offer physical and data link — Open Systems Interconnect Model Layers one and two — connection of the LAN and the channel. Appropriate software that provides functionality at higher layers using de facto standards such as TCP/IP is emerging.

JAMES BRYCE

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3Com

CONTINUED FROM PAGE 53

mental minicomputers and company mainframes. The 3S/200 was designed for smaller work groups.

Also included is built-in support for Ethernet and Apple Computer, Inc.'s Appletalk.

Handles token-rings

According to the vendor, token-ring configurations are accommodated by installing 3Com's Tokenlink adapter into one of the server's four slots, which can also be used to accommodate communications services, fault-tolerant devices and port-expansion units.

Users can add additional memory, up to a total of 14M bytes, through 32-bit bus memory expansion boards that are installed separately.

Powerfail security, co-developed with Elgar Corp. in San Diego, reportedly protects network data from power fluctuations and failures.

For example, Elgar's intelligent power supply is able to automatically trigger 3+ to broadcast a warning to workstations that the server is operating on reserve power and that it will shut down shortly. All the while, it preserves data integrity of files.

Fully automatic tape backup with a capacity of 150M bytes is available in the 3S/401, which offers a menu-driven software interface said to simplify over-the-network backup procedures and reduce the time required to restore files to a server.

Benchmarked vs. PS/2

3Com claimed that independent benchmark tests show the 3S/400 offers up to 50% better performance than IBM's 80386-based Personal System/2 Model 80 workstation running 3+ when used as a server for some network applications.

Those tests were performed by the Lanquest Group, a Santa Clara-based independent network research firm. 3Com said its 3S/400 costs $11,995 — compared with a similarly configured Model 80 with equivalent 3+ features, priced at $14,525.

The Model 3S/200 features 50% more disk capacity — 100M bytes total — double the memory, at 92M bytes, and enhanced ease of installation and configuration by integrating the same 3+ services found on the 3S/400.

The basic-level server is also available with tape backup capabilities in the Model 3S/201.

The 3S/400, priced at $11,995, and the 3S/401, priced at $13,995, reportedly will be available in December.

The 3S/200 costs $7,995; the 3S/201 costs $9,745.

Both are scheduled for availability next month.

The 3P operating system will continue to be available for personal computers adapted as servers and costs $2,100 for an unlimited number of users.

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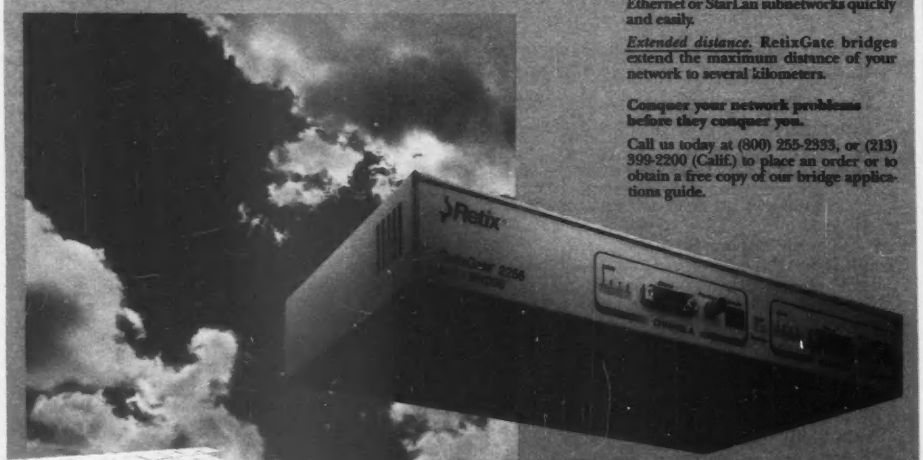

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ISDN trial

CONTINUED FROM PAGE 53

New York. Also utilizing IBM's Systems Network Architecture protocols, workstations and controllers equipped with experimental ISDN interface adapters, the field trial will measure the benefits of improved performance and switching capability on test versions of application programs currently used by Nynex for its internal data processing.

"Our participation in this field trial is based on IBM's commitment to the establishment of international ISDN standards," said Ellen Hancock, an IBM vice president and Telecommunications Products Division president. "These standards should open the door to customer benefits, including reduced costs, flexibility in obtaining and connecting telecommunications equipment and services, as well as new applications made possible by ISDN technology."

"I believe the successful implementation of ISDN will depend upon universal adherence to common standards by switch vendors, terminal equipment manufacturers and telecommunications carriers," said Casimir Skrzypczak, Nynex's vice-president of science and technology.

Portables

CONTINUED FROM PAGE 53

through dial-up means to an IBM mainframe in Garden City. Both Avis and Hertz only use the hand-held devices during peak business hours.

Hertz will not use radio for mainframe uploads, claiming that method bogs down the speed of transmission from the overcrowded airwaves in congested areas. According to Evans, Hertz is now testing various methods of transmission that would require users to upload data to Oklahoma-based mainframes at the end of a business day using a hard-wired connection or a modem link.

The concept for the project was a natural, noted Evans. "We have substantial loads of business whenever two or three wide-body planes get ready to leave the airport," he said. "The renters who return their cars are often full of anxiety, worried about missing their planes. People who have used our system appreciate this convenience very much."

By the year's end, more than 40 other major sites will be using the Instant Return service, including those in Portland, Ore., New York, Boston and Seattle.

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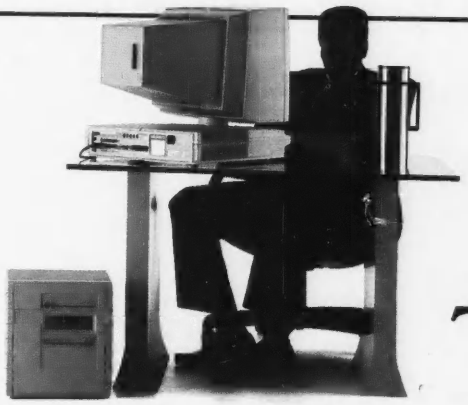

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Floating-Point Engine	N/A			Pipelined, double-precision FPE, 8 MB memory, 1 MB writable control store, 22 double precision megaflops processor	N/A	Optional
VME Card	N/A		Optional Card Adapter			
Operating System	UNIX System V.3					
Networking	IEEE 802.3 (Ethernet) with XNS, TCP/IP					
Network File Access	NFS, RFS (Optional)					
Windowing	Environ V (Standard) and X Windows (Optional)				N/A	

*32C models come with standard 6 MB memory and an 80 MB internal disk drive.

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Banyan Vines version swings on Microvax II

BY PATRICIA KEEFE
CW STAFF

DALLAS — Banyan Systems, Inc. in Westboro, Mass., last week introduced a version of its Vines network operating system that supports Digital Equipment Corp.'s Microvax II.

Banyan's announcement, which came at Networld '87, Novell, Inc.'s annual trade show, underscores the burgeoning interest in the suddenly hot DEC connectivity market, as local-area network vendors scramble to provide their users with links into the VAX environment.

For example, Novell, based in Provo, Utah, is expected to unveil Netware/VMS, a DEC-compatible version of its network operating system, at Comdex/Fall '87 in Las Vegas next week. 3Com Corp. President William Krause has told analysts 3Com will provide links to DEC sometime in 1988. Also, DEC and Apple Computer, Inc. are expected to showcase connectivity between their systems at Dexpo East '88 in February.

Out in the open

Although Vines was developed on a VAX and has been running in-house at Banyan on a VAX since 1983, last week's Networld exhibition was the first public demonstration of that capability.

Some competitive systems allow the VAX to act as a server on the network. Banyan's approach is to provide connection to a VAX processor through terminal emulation at the personal computer or server level.

Written under Unix, the Microvax version of Vines reportedly features network services such as Microsoft Corp. MS-DOS file and print sharing; system administration, including Banyan's Streettalk services; server-to-server communications; and Banyan's E-mail system.

PCs on the network are connected to the Microvax's Q-bus via Ethernet. Any Banyan-supported Ethernet adapter can be used in the PCs; the Microvax II supports an internal DEQNA Ethernet communications controller. Vines was demonstrated on a Microvax II equipped with 5M bytes of memory, 142M bytes of storage and cartridge-tape backup.

Vines on a Microvax is viewed no differently by users than Vines running on other hardware platforms, including Motorola, Inc.'s 68000 series and Intel Corp.'s 80286 and 80386 processors, Banyan said. The next phase in DEC compatibilty for Vines, according to Dave Williams, Banyan's director of product planning, is to transparently integrate terminal emulation and PC file access to the VAX, while also integrating the VAX into the Vines environment.

Interlink 32-bit gate ties IBM boxes, Decnet

BY PATRICIA KEEFE
CW STAFF

FREMONT, Calif. — Interlink Computer Sciences, Inc. recently announced what it claimed is the first 32-bit, Digital Equipment Corp. Microvax-based channel-attached gateway linking IBM mainframes and Decnet networks.

The gateway is capable of data throughput rates of up to 800K bit/sec. and of supporting up to 128 simultaneous sessions, according to Interlink President Lambert Onuma.

The 3732 Gateway Model 400 is based on DEC's Microvax II CPU and uses the MicroVMS operating system. The 3732 also implements Interlink's new communications architecture, Network Port Architecture (NPA).

NPA can reportedly incrementally expand and enhance the functionality of Interlink's future gateway products by adding new components.

This modularity will allow the company in the future to connect to other network standards, such as Transmission Control Protocol/Internet Protocol, the Manufacturers Automation Protocol and the Open Systems Interconnect model, Interlink said.

Linking up

Interlink's turnkey gateway products, including the 3732, were designed to connect IBM or compatible mainframes into Decnet as a peer node. The network controller attached to a block or byte multiplexer channel and on the network side may be Ethernet, asynchronous or synchronous protocols.

The master software resides on the mainframe and runs as an application, the vendor said.

The 3732 network controller incorporates all current features of Interlink's 3711 product, including task-to-task communications, network management and a variety of Decnet hardware interfaces.

New features that extend the functionality of the 3732 include an English-like operator interface, a Microvax hardware and software base and NPA.

The network controller and master Interlink software cost $69,950.

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To improve identified problem areas, DASDMON's Data Set Placement Manager (DSPM) component provides reports that clearly state specific tuning adjustments. DSPM reports are based on a data base of repeated performance problems that DASDMON maintains. The recommendation may include moving a data set across a path or reorganizing a volume—quick solutions to common problems.

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NEW PRODUCTS

Local-area network hardware

An adapter designed to provide IBM Token-Ring network support on Harris Corp.'s 9300 networking communications system product line has been introduced by **Harris Data Communications Division.**

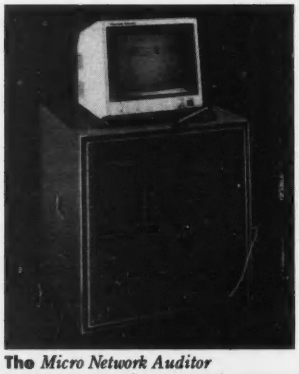
The **Harris 9300 Token Ring Network** adapter features a 4M bit/sec. transfer rate. It enables communications among Harris 9300s over the Token-Ring while personal computer workstations continue to be attached to the Harris 9300 via the Harrisnet 300 network. Communication between 9300 and non-9300 devices is not supported.

The Token Ring Network adapter is priced at $1,295.

Harris, 16001 Dallas Pkwy., Dallas, Texas 75248. 214-386-2000.

The **Micro Network Auditor**, a network station featuring security and auditing software, has been introduced by **Absolute Security, Inc.**

The station is said to provide data security, software quality assurance, program integrity and network management. It works with Novell, Inc.'s PC Net and other networks.



The *Micro Network Auditor*

The Micro Network Auditor captures keystrokes and file activity, analyzes the data by predefined criteria and sounds alarms when deviations are detected. It generates audit trails and custom reports.

The product is priced from $12,750.

Absolute, P.O. Box 399, 63 Great Road, Maynard, Mass. 01754. 617-897-1991.

Local-area network software

A package of software utilities for Novell, Inc. local-area networks has been introduced by the **Riverbend Group.**

The package, called **Hot New Tricks**, includes seven separate programs for both system management and end users.

Included are Hotspool, a network printer management utility; Easytree, an electronic file-management utility; Chat, an interactive conversation utility; Autolog, an audit trail utility; Spaceman, a space management utility for file servers; Userinfo, a cross-reference reporting of Syscon information; and Locate, a utility for determining the location of each network interface card and who is using what workstation and where.

Hot New Tricks is priced at $495 per network.

Riverbend Group, 1491 Chain Bridge Road, McLean, Va. 22101. 703-883-0616.

Network management

The **INM200**, part of the Integrated Network Manager (INM) family, has been announced by **Infotron Systems Corp.**

The INM200 is said to enable management of T1 backbone and sub-T1 access networks. It uses Infotron proprietary software and a multifunction high-resolution color graphics microcomputer to allow central-site management of networks encompassing Infostream 1500 multiplexers, Infostream NX4600 and NX3000 Network Exchanges 990 and 992NP Network Processors and remote statistical multiplexers.

The INM2000 costs $29,500 for single-product networks and $37,000 for multiproduct networks.

Infotron also announced the ANM/NX control and planning tool for T1 backbone networks with two to eight Infostream NX4600 or NX3000 Network Exchanges. It costs $15,000.

Infotron, Cherry Hill Industrial Center-9, Cherry Hill, N.J. 08003. 609-424-9400.

Customer-premise equipment

X.25 Server, a software product, has been announced by **Metacomp, Inc.** for use on its MPA-2000 Multibus data communications controller.

X.25 Server features compliance with the CCITT X.25 specification; support for up to four physical links with data rates in excess of 64K bit/sec.; dynamic configuration of all link- and packet-level operating characteristics; and operation with up to 256 simultaneous virtual circuits.

X.25 Server is available bundled with the MPA-2000. A minimum configuration in quantities of 100 costs $2,395.

Metacomp, 9466 Black Mountain Road, San Diego, Calif. 92126. 619-578-9840.

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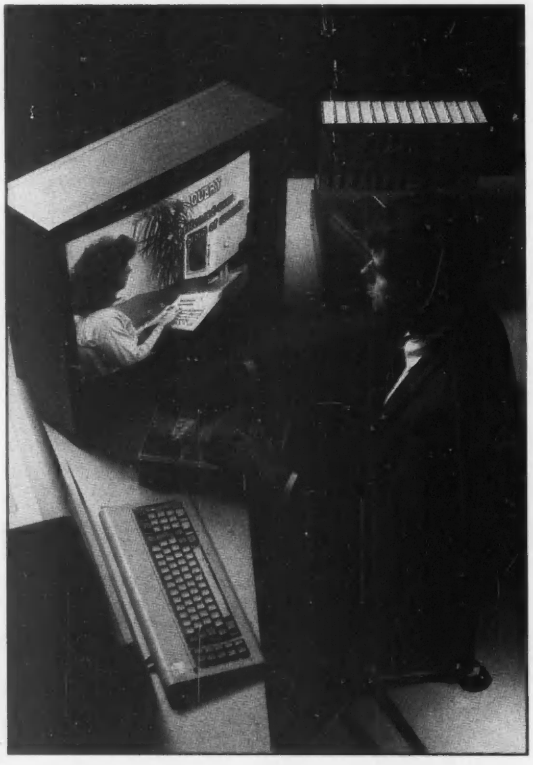

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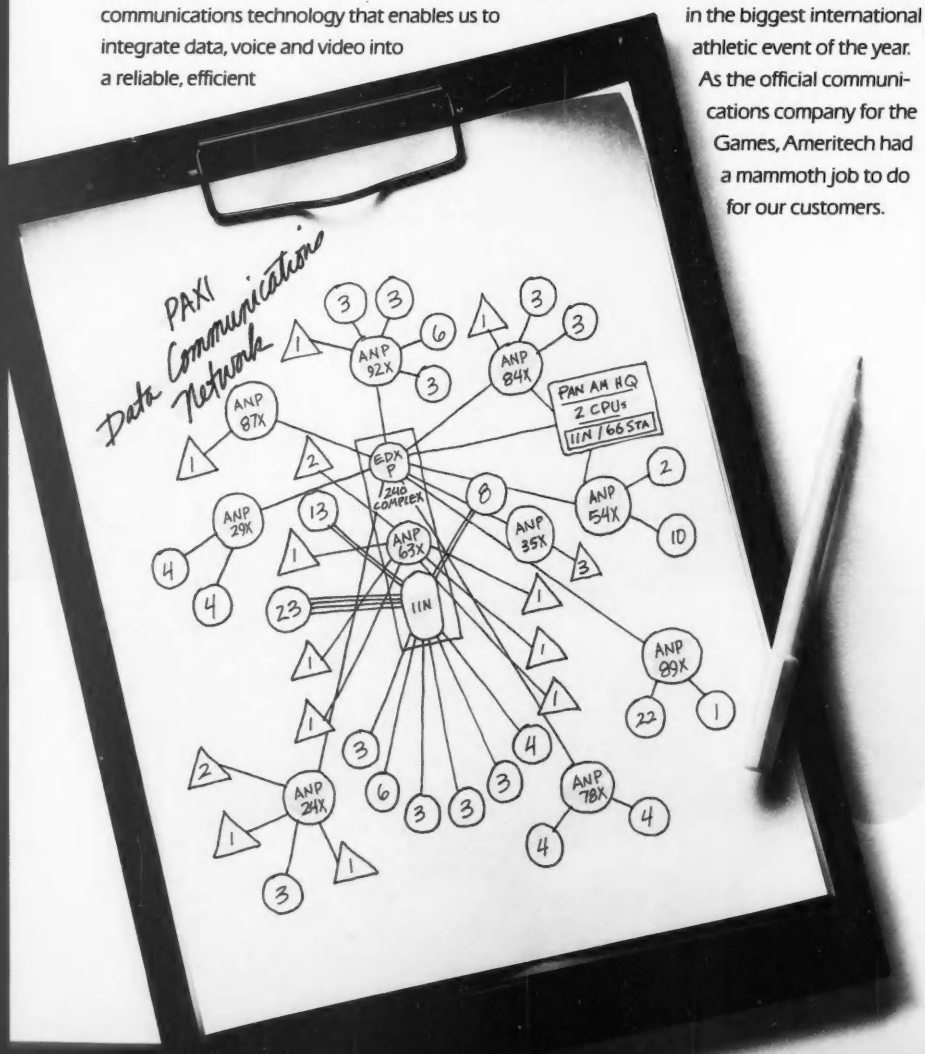
More than 4,400 athletes from 38 nations came to Indianapolis in August, 1987 to compete in the biggest international athletic event of the year. As the official communications company for the Games, Ameritech had a mammoth job to do for our customers.



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Communication was the very heart of the Games. Information concerning everything from security checks and accreditations to medical data, transportation scheduling and event results had to move quickly, dependably and accurately from point to point. If the information stopped flowing, the Games would come to a halt.

What's more, a great number of locations were involved. These included 23 separate Game sites in and around Indianapolis. There were also 18 operating divisions of PAX/ Indianapolis, the Organizing Committee for the 10th Pan American Games. Our network had to link all these locations together.

In performing this complex assignment, we functioned as PAX/I's communications partner, much the same way we work with all our customers.

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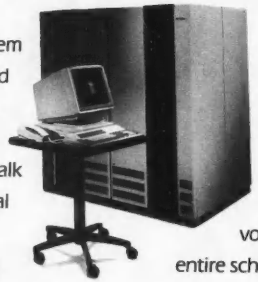
Ameritech was the systems network manager for the Pan Am Games organization. That meant assuring the integration of our network with equipment and software from a number of different manufacturers.

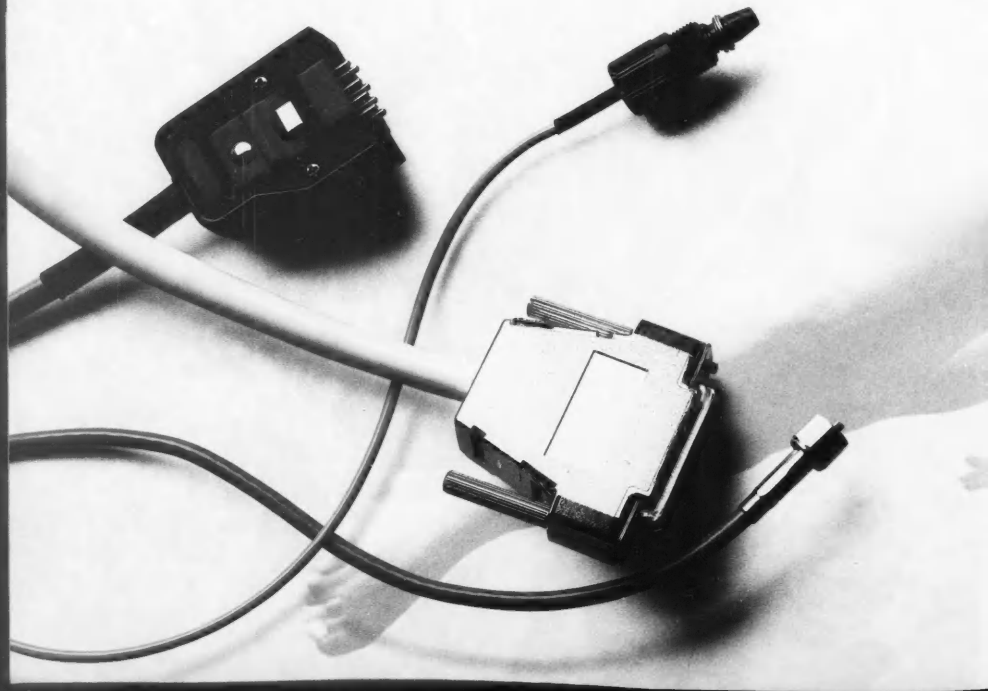
We had to design a system where diverse elements could operate in harmony. So that, for example, one supplier's mainframe computer could talk to another supplier's personal computers and both could talk to a third supplier's data terminals.



WE TOOK THE TIME TO PLAN, TO CHECK AND RECHECK.

We set the groundwork carefully, because we know that thorough planning is vital to efficient systems integration. The more effort we devoted at this stage, the surer we could be that the Games would run without any interruption in communications.

Our plans were designed to provide an integrated, end-to-end voice, data and video system for the entire schedule of the Games.



AMERITECH'S SPECIAL
PAN AM NETWORK SIMULATOR.
We have a long history of managing the complex public communications network. We drew on this experience and used off-line simulation so every type of technology the customer was considering for the Pan Am Games could be tested in a network configuration. It was a comprehensive, realistic proving ground for hardware, software and the system itself, and it gave us the opportunity to gain experience in spotting and correcting potential problems.
This simulation procedure is the kind of in-operation pretesting that Ameritech can provide for business communications.
AMERITECH

A TROUBLE-FREE SYSTEM OPERATING CONTINUOUSLY WITH SPLIT-SECOND SPEED.

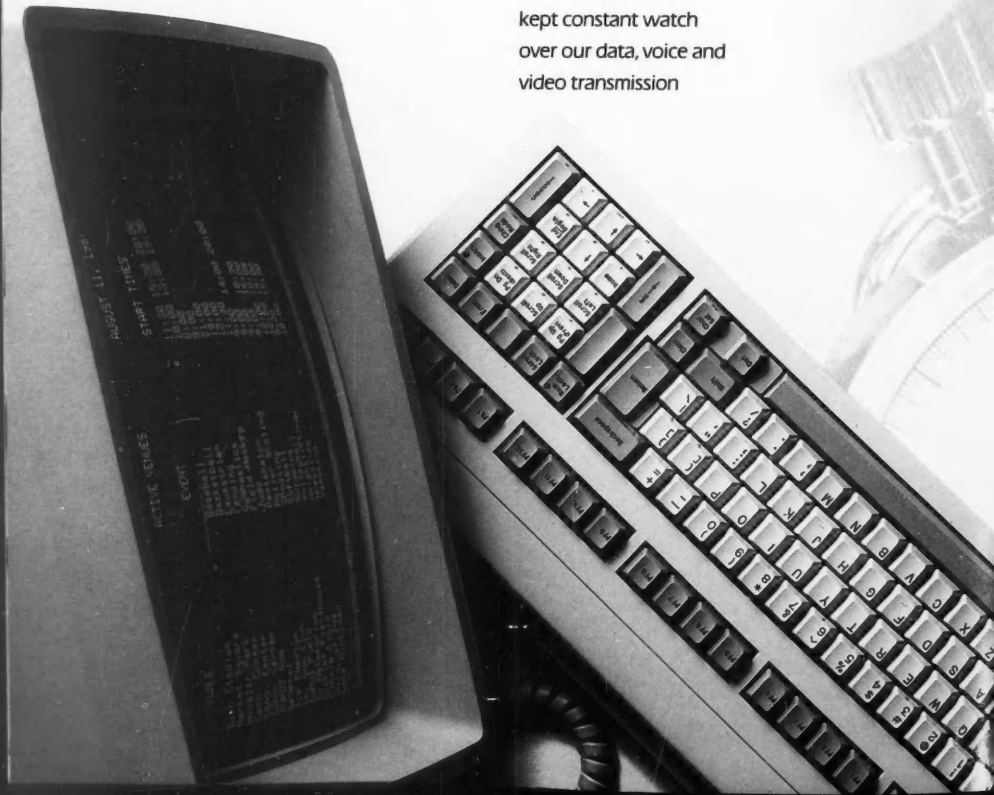
Systems network management is the key to successful communications. Our management experience and expertise enabled us to keep information flowing without interruptions during the Pan Am Games.

Ameritech had the capabilities to provide continuous end-to-end monitoring and diagnosis of every component of the Pan Am Network. So the network functioned smoothly and the full measure of its power was available at all times during the Games.

THE NETWORK MANAGEMENT CENTER.

Here was the brain behind the integrated network system that Ameritech designed and operated for the Games. The Network Management Center was equipped with the world's most sophisticated tools for tracking, detecting and isolating potential problems.

At the Center, Ameritech personnel kept constant watch over our data, voice and video transmission

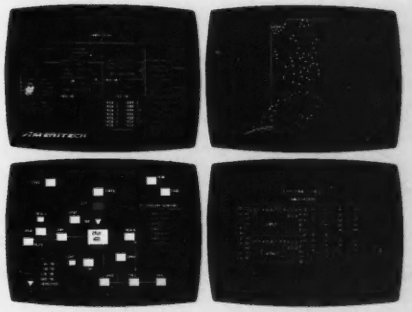


facilities. We also have the expertise to monitor and maintain other suppliers' equipment.

HOW TO CATCH A GLITCH.

We stopped trouble in its tracks by quickly pinpointing conditions that could produce a problem. It might have been in an individual circuit. Or it might have been in a terminal control unit. Whatever the cause, Ameritech people could spot it and take the steps to have it fixed. All done so speedily and efficiently that the problem never became a problem for the customer.

This same high level of service is available to businesses in the Ameritech region.



Monitoring screens in the Network Management Center quickly help trace, pinpoint and overcome potential problems. The Center has incredible trouble-shooting capabilities.

AMERITECH

THE TALENT, THE TECHNOLOGY, THE TEAM.

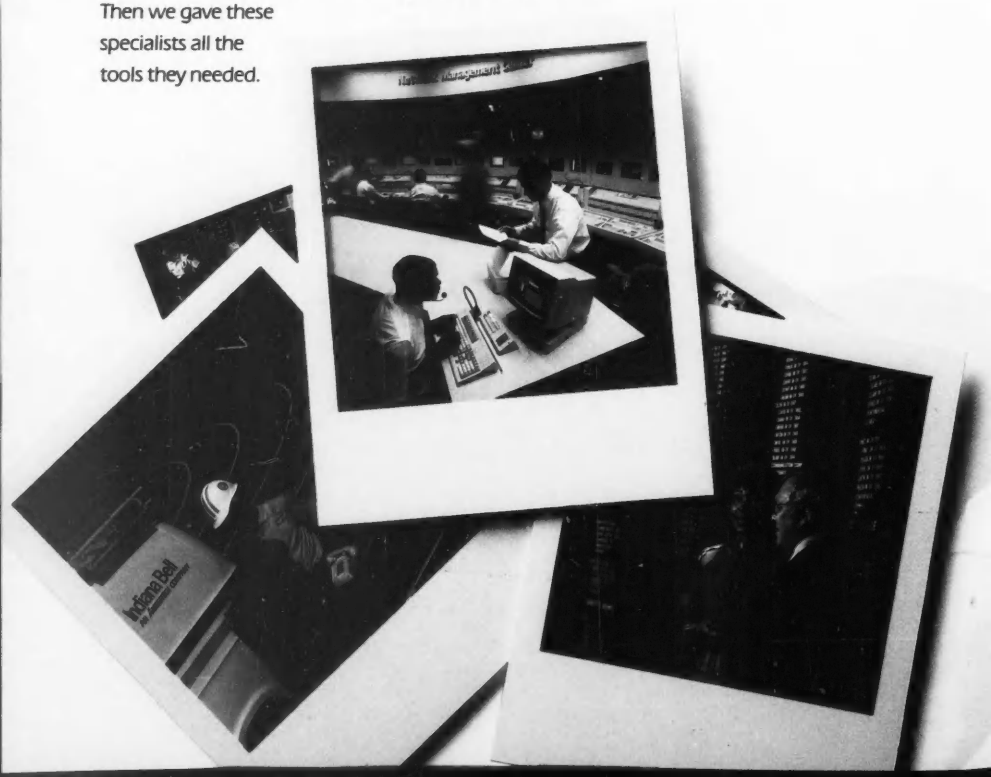
Ameritech put an all-out effort into assuring the success of the Pan Am Games. Our highly skilled people worked as a team to create and implement the solutions that helped the Games communicate.

We assembled experts from our Ameritech Bell companies of Illinois, Michigan, Ohio and Wisconsin to assist our primary communications team from Indiana Bell. Customer support was also provided by other members of our Ameritech family as well: Ameritech Mobile, Ameritech Publishing and Ameritech Communications. Then we gave these specialists all the tools they needed.

WE BRING ADVANCED TECHNOLOGY WITHIN REACH OF EVERY BUSINESS WE SERVE.

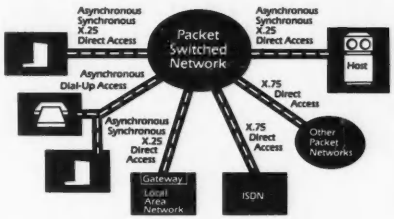
Through the products of the Ameritech Business Network, we can help all our customers handle a full range of data, voice and video communications. Our network can transport both high and normal volumes of information, in continuous or intermittent streams.

What is more, this advanced communications network is already in place. We're in position to provide the systems and support you need.



THE AMERITECH BUSINESS NETWORK WAS READY FOR ACTION.

The Ameritech Business Network, a family of advanced digital communications products, was available for the Games.



The Ameritech Packet Switched Network. One of the Ameritech Business Network products that helped the Pan Am Games communicate.

It enabled us to provide greater flexibility and cost efficiencies in the movement of information, and it played a key role in every stage of the Games' operation.

Some of the locations needed only reliable voice communications. Some also needed high-speed, highly accurate data transmission over private digital lines. Others required the speed and security of private line transmission along with the economies offered by our public communications network.

The products of the Ameritech Business Network met all these needs. They can be tailored for any specific situation, and they provide the exceptional control necessary to adapt to changing business requirements.

Ameritech's Pan Am communications network included more than 5,000 voice, data and video circuits, some 1,300 miles of fiber optic cables, 1,300 telephones, and 40 cellular mobile telephones. Ameritech also published special multilingual phone directories for the Games.

AMERITECH

PUT OUR TRACK RECORD ON YOUR SIDE.

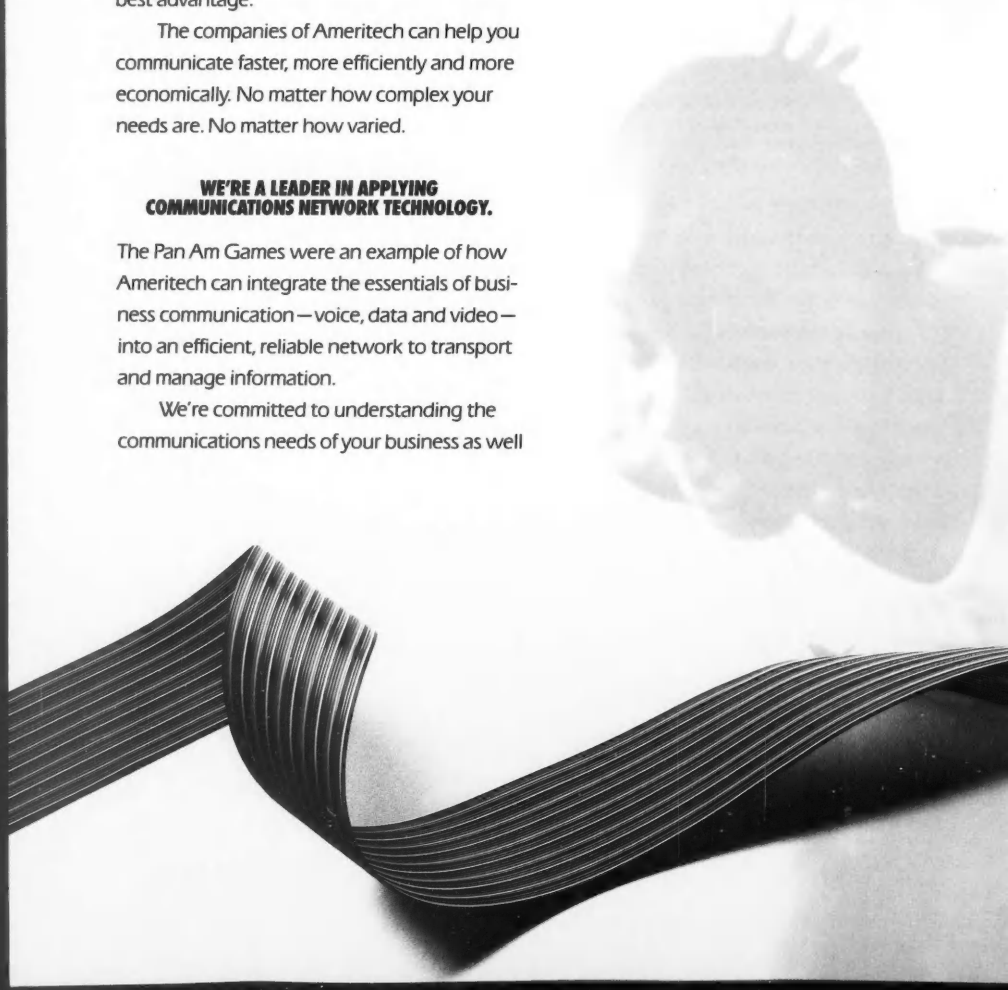
Communications can be the winning difference for your business. Because, as you know, information is becoming a greater and greater source of business power. The race will be won by those who gather and use that power to their best advantage.

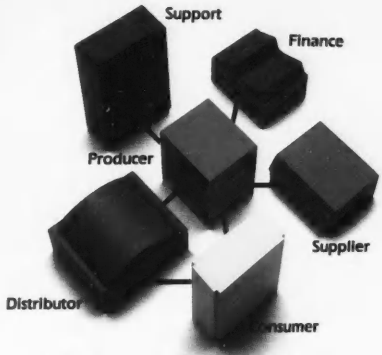
The companies of Ameritech can help you communicate faster, more efficiently and more economically. No matter how complex your needs are. No matter how varied.

WE'RE A LEADER IN APPLYING COMMUNICATIONS NETWORK TECHNOLOGY.

The Pan Am Games were an example of how Ameritech can integrate the essentials of business communication—voice, data and video—into an efficient, reliable network to transport and manage information.

We're committed to understanding the communications needs of your business as well as you do. Ameritech will work in partnership with you to develop customized applications of the Ameritech Business Network and our other world-class products and services.





We help establish vital communications links between businesses that need each other.

ASK US TO PROVE OUR WORTH TO YOU.

Your own communications needs are unique. You have critical locations to link. Growth to consider. Above all, you want to be sure of having the right system for fast, accurate and dependable operation.

Give Ameritech the challenge. We've shown we have the talent, the technology and the team to bring your business a winning performance.

AMERITECH

THESE ARE THE COMPANIES OF AMERITECH.

The resources of the Ameritech companies helped bring you the Pan Am Games by designing and managing the most modern communications system available today. These same resources are available to serve you and meet your total communications needs.

AMERITECH'S BELL COMPANIES and their sales subsidiaries provide advanced communications services to more than 11 million business and residential customers in the Great Lakes area. The Bell companies are: Illinois Bell, Indiana Bell, Michigan Bell, Ohio Bell and Wisconsin Bell.

ADR (Applied Data Research, Inc.) develops, markets and supports a comprehensive line of systems software products primarily for IBM mainframe and personal computers.

AMERITECH COMMUNICATIONS provides marketing support and state-of-the-art equipment and systems to the Ameritech Bell companies' sales subsidiaries. It has a national sales and service arm of its own.

AMERITECH CREDIT CORPORATION arranges competitive financing for companies that lease communications products and services through the Ameritech Bell companies and their sales agents.

AMERITECH DEVELOPMENT CORPORATION supports the growth of the Ameritech companies by finding and developing new products, technologies and business relationships that complement Ameritech's strategic direction.

AMERITECH MOBILE COMMUNICATIONS provides wirefree communications including advanced cellular mobile telephone and paging products and services.

AMERITECH PUBLISHING publishes Ameritech PagesPlus® directories for the Ameritech Bell companies and other specialty directories.

AMERITECH SERVICES, owned jointly by the Ameritech Bell companies, provides staff support to help the companies attain their business goals.

For more information on how the Ameritech companies can help you communicate, call us at 1 800 562-2444.

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Helping you communicate.™

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Computerworld First with the news that's important to you.

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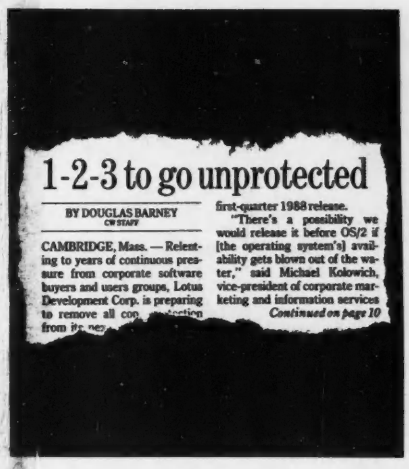


1-2-3 to go unprotected

BY DOUGLAS BARNEY
CW STAFF

CAMBRIDGE, Mass. — Relenting to years of continuous pressure from corporate software buyers and users groups, Lotus Development Corp. is preparing to remove all cop[illegible] from its ne[illegible]

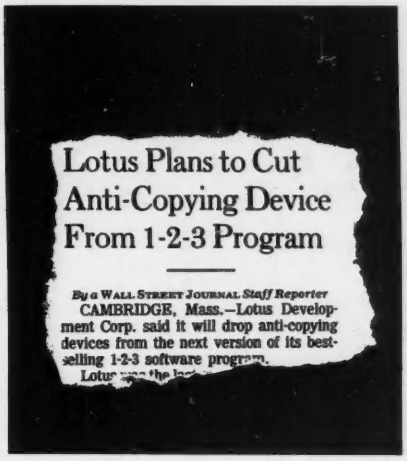
first-quarter 1988 release.

"There's a possibility we would release it before OS/2 if [the operating system's] availability gets blown out of the water," said Michael Kolowich, vice-president of corporate marketing and information services

Continued on page 10

September 14, 1987

Wall Street Journal:



Lotus Plans to Cut Anti-Copying Device From 1-2-3 Program

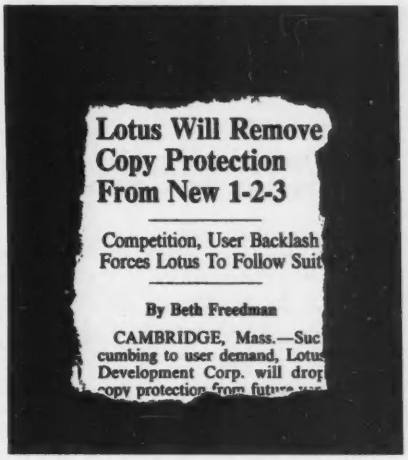
By a WALL STREET JOURNAL *Staff Reporter*

CAMBRIDGE, Mass.—Lotus Development Corp. said it will drop anti-copying devices from the next version of its best-selling 1-2-3 software program.

Lotus [illegible] the lac[illegible]

September 16, 1987

PC Week:



Lotus Will Remove Copy Protection From New 1-2-3

Competition, User Backlash Forces Lotus To Follow Suit

By Beth Freedman

CAMBRIDGE, Mass.—Succumbing to user demand, Lotus Development Corp. will drop copy protection from future [illegible]

September 22, 1987

Because you can't wait.

COMPUTERWORLD

An IDG Communications Publication

Links

In support of Digital Equipment Corp.'s introduction of Version 2.0 of its Ultrix-32 operating system, **Advanced Computer Communications** has announced two compatible communication interfaces.

Designated **ACP 5250** and **ACP 6250**, the interfaces are said to bring CCITT X.25 networking to DEC Microvax II and VAX systems, respectively, running the Ultrix 2.0.

The interfaces perform the task of processing X.25 protocols in their own firmware. Both support 64 simultaneous virtual circuits that are multiplexed over single network lines.

The ACP 5250 costs $4,200, and the ACP 6250 costs $6,490.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, Calif. 93101. 805-963-9431.

Electronic mail

Inner Loop Software has released an enhanced version of its IBM Personal Computer-based multiline bulletin board system, **DLX**.

Added features of DLX Version 4.0 include group chat, which enables all callers to interact on-line simultaneously, a keyword-addressable data base subsystem, improved customizing features and enhanced documentation.

Additional features include public and private electronic mail, Xmodem file transfer, direct user-to-user chatting, multiple choice and essay questionnaires and remote maintainability.

DLX supports up to nine telephone lines. A two-line version costs $200. A nine-line version costs $400.

Inner Loop, Suite 120, 5456 McConnell Ave., Los Angeles, Calif. 90066. 213-822-2800.

Modems/Multiplexers

The **Datalink 208/201**, a Bell 208- and 201-compatible modem, has been announced by **Penril Datacomm**.

The modem operates at a primary data rate of 4.8K bit/sec. with fallback rates of 2,400 and 1,200 bit/sec. At 4.8K bit/sec., it is compatible with Bell 208 A/B and CCITT V.27 bis/ter. standards; it complies with CCITT V.26 and V.27 bis/ter. and Bell 208 standards at 2,400 bit./sec and CCITT V.26 at 1,200 bit/sec.

Operation is full duplex on four-wire leased unconditioned lines; half-duplex on two-wire leased lines; full duplex on two-call dial lines; and half-duplex on a single call dial line. An optional asynchronous-to-synchronous converter for use in asynchronous applications is available.

The Datalink 208/201 costs $1,295.

Penril Datacomm, 207 Perry Pkwy., Gaithersburg, Md. 20877. 301-921-8600.

AJ DSM, said to provide data compression ratios up to 4-to-1 for 1,200 and 2,400 bit/sec. modems, has been announced by **Anderson Jacobson, Inc.**

The device combines asynchronous data compression with the vendor's enhanced Microcom, Inc. MNP Level 4 for error-free data transfer up to 9.6K bit/sec., the vendor said.

Features include Dynamic packet sizing, which automatically adjusts to line quality.

AJ DSM compresses all types of asynchronous data, including text, binary files, interactive graphics, data base files and spreadsheets.

The stand-alone AJ DSM is compatible with standard 1,200 and 2,400 bit/sec. modems.

It costs $395.

It is also available in the vendor's AJ 2412-SCI and AJ 2441-1C1 2,400 bit/sec. modems, priced at $995 and $1,195, respectively.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131. 408-435-8520.

Diagnostic equipment

The **Experdata S20** Starlan tester, a portable test tool for checking the physical elements of a Starlan local-area network, has been announced by **Experdata, Inc.**

The product allows system administrators to test Starlan components, check for conformance to the IEEE 802.3 1Base5 standard, measure traffic on the network, simulate types of traffic for capacity planning and troubleshooting and maintain the network.

According to the vendor, one S20 can be used to check a Starlan Hub before it is installed on a network; two S20s are used on the network to perform such tests as echo, collision and line quality.

Each S20 is priced at $4,500.

Experdata, 10301 Toledo Ave. S., Bloomington, Minn. 55437. 612-831-2122.

Cabling

A fiber-optic remote repeater called the **Model 8802** that was designed to connect two separate Ethernet segments to 1,000 meters or more has been announced by **Canoga-Perkins.**

The 8802 features automatic and manual segmentation and six diagnostic LEDs on the front panel. It interfaces with IEEE 802.3-standard transceivers and retimes and amplifies all signals it recieves from one Ethernet segment to the next.

The price of the Model 8802 is $1,300 per unit.

Canoga-Perkins, 21021 Lassen St., Chatsworth, Calif. 91311. 818-718-6300.

FOR MVS OR MVS/XA ENVIRONMENTS

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AND WE'LL PROVE IT!

OVER 200 DP MANAGERS HAVE COMMITTED TO THE GOAL OF "ZERO DEFECT" QUALITY CONTROL . . . HAVE YOU?

"ZERO DEFECT" Production Control means NO incorrect results get past your quality control net. To attain "ZERO DEFECTS" means fewer initial errors and more efficient detection of those that occur. A difficult task. . . but BETA Systems is helping to achieve it in over 200 MVS installations.

ABSOLUTE CONTROL (BETA 91) – "The most automated production verification tool in existence." An automated balancing and quality control system which provides a standardized interface to automate most batch verification or restart procedures. For error detection, ABSOLUTE CONTROL can scan existing reports, or be called from within programs to capture control totals, record counts, dataset names, or other required information. Take control of production processing with the verification tool that gives you "ABSOLUTE CONTROL."

OSCAR (BETA 92) – Facilitate quick, easy retrieval of online or historical listings. OSCAR is the most powerful & complete Online SYSOUT Control. Archival and Retrieval System available. With online browsing, you can eliminate the need to print JCL, SYSLOG and many other listings. OSCAR will automatically flag errors and archive SYSOUT to offline media. Install OSCAR in the morning . . . and profit from savings in time and reduced reruns in the afternoon.

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Please send information on:
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Have someone contact me:
☐ I'd like a demonstration of "ZERO DEFECT" software running on my system.

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Telephone (____) _____ CPU Make/Model _____ Op Sys _____

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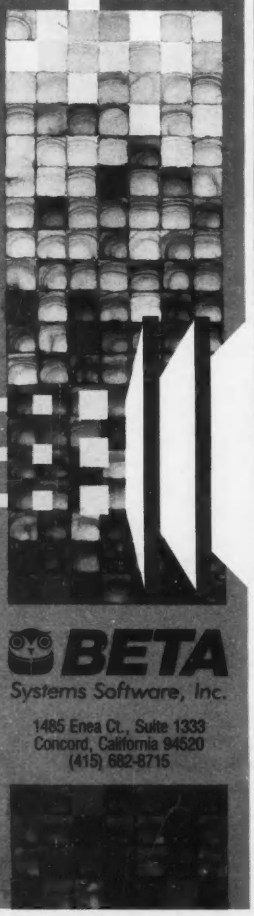


SYSTEMS & PERIPHERALS

HARD TALK

James Connolly

Gloves off in center ring

That rumbling noise in the distance is not the sound of a southbound freight, and that trembling of the ground is not a Southern California aftershock.

What people on the MIS and vendor sides of the computer business hear and feel are echoes and impacts of artillery barrages being traded by the two largest forces in the industry: IBM and DEC.

Those who watch and listen, whether they are MIS managers or the lesser rivals of DEC and IBM, can only sit and wait. They can wonder how close the combat will come to them and who, if anyone, will win. One thing they can be sure of, however, is that the battle of IBM vs. DEC can only get nastier.

Mounting tension

About a month ago, the increased competition between IBM and DEC was the subject of a column in these pages. It was apparent, at the time, that the head-knocking by IBM and DEC in the mid-range was going to get more serious as each company boasted of its mid-range systems.

The clash will still intensify, and the user still is likely to gain, because the two vendors will have more reason than ever to keep their mid-range and connectivity products competitive in the areas of price and performance.

But new and bigger weapons have been wheeled into the fray during the past month as IBM has launched a salvo in response to months of DEC's sniping.

Ever since DEC's wave of success began about two years ago, DEC officials, whenever possible, have let the word slip out about DEC's replacement of IBM systems at user sites. It has been a means to affirm DEC's dedication to serving the MIS market.

Then, in a short news release this month, IBM reported that it had sold a 3090 mainframe to a Massachusetts company. IBM seldom notifies the media about new installations, the exceptions

Continued on page 70

Altos 386 system runs Unix

Entry-level multiuser offering merges AT&T's System V.3 with Xenix

BY JULIE PITTA
CW STAFF

SAN JOSE, Calif. — Altos Computer Systems recently introduced an Intel Corp. 80386-based multiuser system that runs the Unix operating system.

Called the Altos 386 Series 1000, the system features Unix V/386, a version of AT&T's operating system that merges Unix System V.3, Release 1 with Santa Cruz Operation's Xenix operating system. It represents Altos' second 80386-based computer. The firm's 386 Series 2000, a higher end multiuser system targeted at 20- to 64-user configurations, was introduced last May.

The new 386-based system, which the company said is positioned as its entry-level multiuser offering, was designed for applications requiring between two and 24 users.

Five configurations are available. An entry-level version, called the Model 1204, reportedly supports up to eight users, offers 2M bytes of random-access memory (RAM) and features a 5¼-in. 40M-byte hard disk drive with a small computer systems interface (SCSI) and a 1.2M-byte floppy disk drive.

A second configuration, called the Model 1204T, adds to that a 125M- to 150M-byte SCSI cartridge tape drive.

A mid-range version, called the Model 1209T, provides 2M bytes of RAM, a 5¼-in. 90M-byte hard drive and a 125M- to 150M-byte SCSI cartridge tape drive.

Two higher end configurations — the Models 1409T and 1415T — offer 4M bytes of RAM. The Model 1409T features a 90M-byte hard drive and a 125M- to 150M-byte SCSI cartridge tape drive, while the Model 1415T offers a 150M-byte SCSI hard drive as well as the tape drive.

Prices for the systems range from $7,000 to $17,000. Shipments to Altos distributors, value-added resellers and OEM customers are scheduled for December. Unix V/386 is priced separately at $795.

All five versions of the new system feature a 16-MHz 80386 microprocessor, Intel 80387 floating-point coprocessor support, an Intel 80186 controller and eight RS-232 ports. RAM is expandable to 16M bytes in 2M- or 4M-byte increments.

Data View

IBM tightens grip

IBM dominates Computer Intelligence's list of top 10 general-purpose computers based on value of U.S. installations

June 1987 rank	January 1987 rank	Manufacturer and system	Purchase price	Installed systems
1	1	IBM 3090 Model 200	$7M	939
2	2	IBM 4381	$840,000	5,528
3	3	IBM System/36	$60,000	72,833
4	12	IBM 3090 Model 400	$11M	325
5	4	IBM 3081	$2M	1,497
6	5	IBM 3084	$4M	715
7	6	DEC VAX-11/780, /782, /785	$140,000	18,490
8	7	DEC VAX 8600/8650	$550,000	4,524
9	13	IBM 3090 Models 120, 150, 180	$4.2M	575
10	7	IBM System/38	$200,000	11,518

INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART

OCR scanner picks up pace

BOSTON — Recognition Equipment, Inc. is scheduled this week to announce a multifont optical character recognition (OCR) page reader at the Data Entry Management Association's annual conference here.

The system, called the Tartan XP80, is based on a Motorola, Inc. 68020 32-bit microprocessor.

It can read machine-generated print at a rate in excess of 5,000 char./sec., according to the vendor.

The Tartan XP80 also features the ability to read forms with controlled alphanumeric hand-printing, a single typeface

Continued on page 71

X-ray tool cures MD's access ills

BY STANLEY GIBSON
CW STAFF

KALAMAZOO, Mich. — I/Pacs, Inc. recently announced that it has developed a computerized hospital radiology system based on the IBM System/38.

The system digitizes X-ray images and stores them along with written or voice annotation, according to Dr. James McGee, director of medical imaging at Borgess Medical Center, who developed the system here.

"Any number of specialists can pull the X-ray image up on their office or hospital computers and review it at the same time," McGee said, pointing out that previously, doctors had to gather in one place to view a single film image. The X-ray images can also be transmitted outside the hospital to doctors' homes or offices, he said.

Using conventional methods, doctors had to wait from four to 48 hours for radiologist reports to be transcribed, McGee said. Using I/Pacs, however, radiologists dictate directly into the computer system, using a voice-to-text capability to transcribe

Continued on page 70

Inside

- Masstor boosts storage for video-based systems. Page 70.
- Disk subsystem designed for imaging display applications. Page 71.
- Fujitsu unleashes most powerful member of Pick-based family. Page 71.

Faster microprocessors boost Arete's Unix line

BY JAMES CONNOLLY
CW STAFF

SAN JOSE, Calif. — Arete Systems Corp. recently expanded its family of Unix-based departmental systems with the debut of three processors and CPU upgrades for existing systems.

In addition, the company last week announced an agreement with Sun Microsystems, Inc. under which Arete will base a line of systems, to be introduced in 1988, on Sun's Scalable Processor Architecture.

However, the systems most recently added to Arete's product line are based on a faster version of the Motorola, Inc. 68020 microprocessor. The Systems 825, 850 and 875 all use a 25-MHz 68020, compared with a 12.5-MHz 68020 used in the earlier System 800. Arete also announced implementation of AT&T's Unix System V, Release 3 and upgrade options to install the 25-MHz chip in place of the 12.5-MHz 68020 in the existing System 1200 and 1600.

Those new systems and upgrades reportedly will be available next month.

An entry-level System 825 features 8M bytes of memory, a 170M-byte disk drive, a 150M-byte streaming cartridge tape drive and an eight-port communications processor. It can be expanded to support 64M bytes of memory, 510M bytes of internal and 5.5G bytes of external hard-disk storage and 14G bytes of optical disk storage. It supports up to 128 users, Arete said.

The Systems 850 and 875 can expand to support more than 200 users and include 64M bytes of memory, 8.9G bytes of hard-disk storage and 28G bytes of optical disk storage.

The Unix System V, Release 3 implementation, known as Arix V.3 Release 1, costs $1,300. The entry-level System 825 costs $26,000. The System 850 with 8M bytes of memory, a 335M-byte disk drive and three eight-port communications processors costs $42,250. The System 875, which differs from the System 850 in that it supports a nine-track tape drive with cache and up to 1.5G bytes of internal storage, costs $48,250 in a configuration comparable to the basic System 850.

Masstor doubles system storage

SANTA CLARA, Calif. — Masstor Systems Corp. last week introduced a field upgrade option designed to double the recording density and transfer rate of the company's M860 line of video technology-based storage systems.

The upgrade doubles the storage capacity of an M860 module from 55G to 110G bytes and doubles a fully configured system's capacity from 440G to 880G bytes, the vendor said.

The sustained aggregate data transfer rate has been doubled to 3M bytes over two data channels, according to Masstor officials.

Designed for use with mainframe-class systems, the M860 uses helical-scan recording technology.

The double density reportedly can be achieved by increasing the capacity of individual tape cartridges from 175M to 350M bytes.

Masstor officials said the capacity of a cartridge can be increased to 700M bytes through use of a data compression technique that the company introduced in June.

An upgrade for a minimum M860 system costs from $220,000 to $260,000, depending on the features ordered.

X-ray tool

CONTINUED FROM PAGE 69

the report. Therefore, doctors can review the report much faster, he explained.

For voice recognition, the system uses IBM's voice-recognition product, which can support an active vocabulary of 64 words.

Hospitals can save money by reducing transcription work, film duplication, processing, sorting, retrieving and distributing information, McGee said. The system can also speed treatment of patients, shortening their hospital stays and, thus, reducing their bills.

The I/Pacs software can run on any System/38, McGee said. A System/38 Model 300 is installed at Borgess Medical Center. He recommended that 3G to 5G bytes of disk storage be used with a typical system.

The Borgess system cost approximately $1 million for the hardware, software, installation and customization. About $650,000 of that total was spent on hardware, $250,000 on software and $50,000 on customization, McGee said.

The system will be available in November, according to McGee. It can be installed either as a stand-alone system or in existing hospital systems. I/Pacs is intended to be customized for each hospital in which it will be used, McGee added.

Images can be stored in the system for more than two months, if necessary, although the normal time for an image to be in the system is seven days, McGee said.

Long-term storage can be done, however, by transferring the digitized images to film, McGee said. I/Pacs is developing an optical disk storage system because of interest expressed by potential customers. I/Pacs expects to offer the optical system in the first quarter of 1988, according to McGee.

Gloves off

CONTINUED FROM PAGE 69

being first shipments of new models and donations of systems to nonprofit organizations.

What made this sale exceptional — so much so that an IBM manager reportedly hand-delivered the press release to at least one daily newspaper — was the fact that the 3090 Model 120E was replacing a DEC system.

Furthermore, the IBM-for-DEC replacement did not compare to the DEC-for-IBM swap typically mentioned by DEC, in which state-of-the-art DEC Microvaxes displace doomed IBM 8100s or big DEC VAXs bump out discontinued IBM 4341s.

What made IBM crow was that this MIS shop was dumping DEC's touted Vaxcluster, two relatively new VAX 8650s and DEC's biggest uniprocessor, a VAX 8700, in favor of the 3090.

DEC's handicap

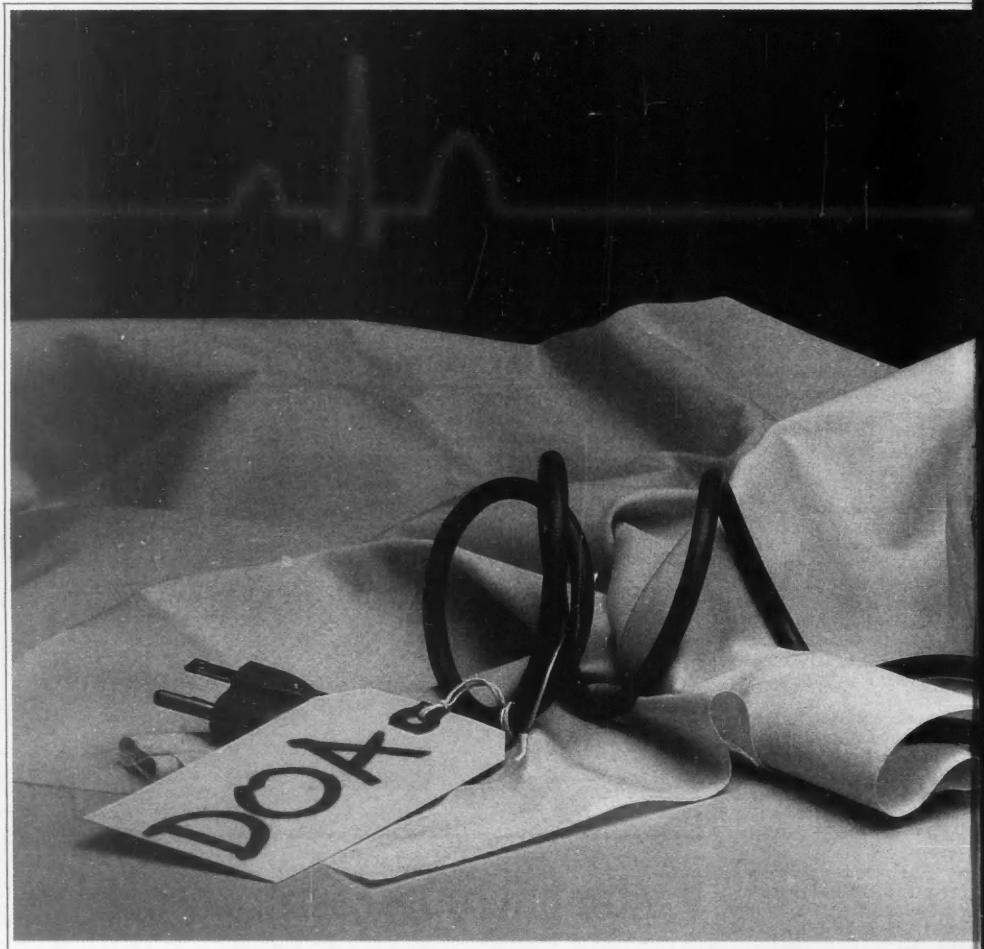
Reports of the sale also coincided with media and analyst speculation that DEC's move into MIS is handicapped by shortcomings of its VAX architecture and VMS in transaction processing.

That is a failing that DEC engineers clearly are working to address — although apparently not fast enough to satisfy the user who opted for the 3090 because the Vaxcluster could not handle his transaction load.

The question now is which of the two companies will fire the next round of heavy artillery. Will it be IBM going public with another 3090 sale or the installation of 100 of its 9370 minicomputers? Or will it be DEC trumpeting a user's choice of Vaxclusters, 8700s and Microvaxes over IBM's offerings?

Whichever company takes the next step, users can be fairly sure of one thing, and that is the knowledge there will be no shortage of customer references — whether splashed across the newspapers or whispered in semiconfidence — when they, the users, are faced with a choice between DEC and IBM.

Connolly is *Computerworld's* senior editor, systems & peripherals.



A Datacomm Problem Today; A Datacomm Disaster Tomorrow

Created by Dayner/Hall, Inc., Winter Park, Florida

Ramtek expands graphics storage

SANTA CLARA, Calif. — Ramtek Corp. recently announced a disk subsystem for imaging and graphics display applications said to offer a burst data transfer rate of up to 8M byte/sec.

Called the Imagedisk, the base system configuration consists of an intelligent controller and a bank of four 5¼- or 8-in. disks. According to a company spokesman, storage capacity ranges from 560M to 16G bytes. A 1.2G-byte subsystem can store up to 4,800 8-bit, color, 512- by 512-pixel resolution display frames, the spokesman said.

The Imagedisk was designed for use with such display devices as Ramtek's 4660 high-resolution imaging display system. The vendor said the high data transfer rates let the subsystem be used as virtual display memory for attached display devices. Up to six DR11W interfaces can be attached to the subsystem.

The controller is capable of writing vector files as well as performing file management and automatic error detection and handling, including bad-sector tagging and seek-error notification.

A base system, including a controller and four disks with up to 1.2G bytes of memory, is priced at $65,000. Each additional 1.2G bytes of memory costs $33,000, the vendor said.

Fujitsu CPU strongman of Pick line

SAN JOSE, Calif. — Fujitsu Microsystems of America, Inc. recently introduced the most powerful member of its Pick Systems Pick-based business computers, the 64-user System 2400 Model 60.

Built around the Motorola, Inc. 68020 microprocessor, the system reportedly supports twice as many users as the System 2200 Model 50, which was announced in March.

The Fujitsu Series 2000 now supports from eight to 64 users, according to the vendor.

The basic System 2400 Model 60 costs $100,000. It includes 2M bytes of memory, 171M bytes of disk storage, a 60M-byte tape drive, one parallel port, 16 RS-232C ports, a 1.2M-byte flexible disk drive and an uninterruptible power supply.

The system also can be expanded to support 8M bytes of memory and 1G byte of disk storage.

The CPU features a clock speed of 16.67 MHz and 16K bytes of on-board cache memory. The system runs Fujitsu's enhanced Pick operating system.

OCR scanner

CONTINUED FROM PAGE 69

or multiple typefaces as well as the ability to read forms prepared on a variety of typewriters and printers, according to the vendor.

Customize for special needs

According to company spokesmen, the system can be customized to allow for such specific processing needs as reading machine- and hand-printed characters intermixed on the same line.

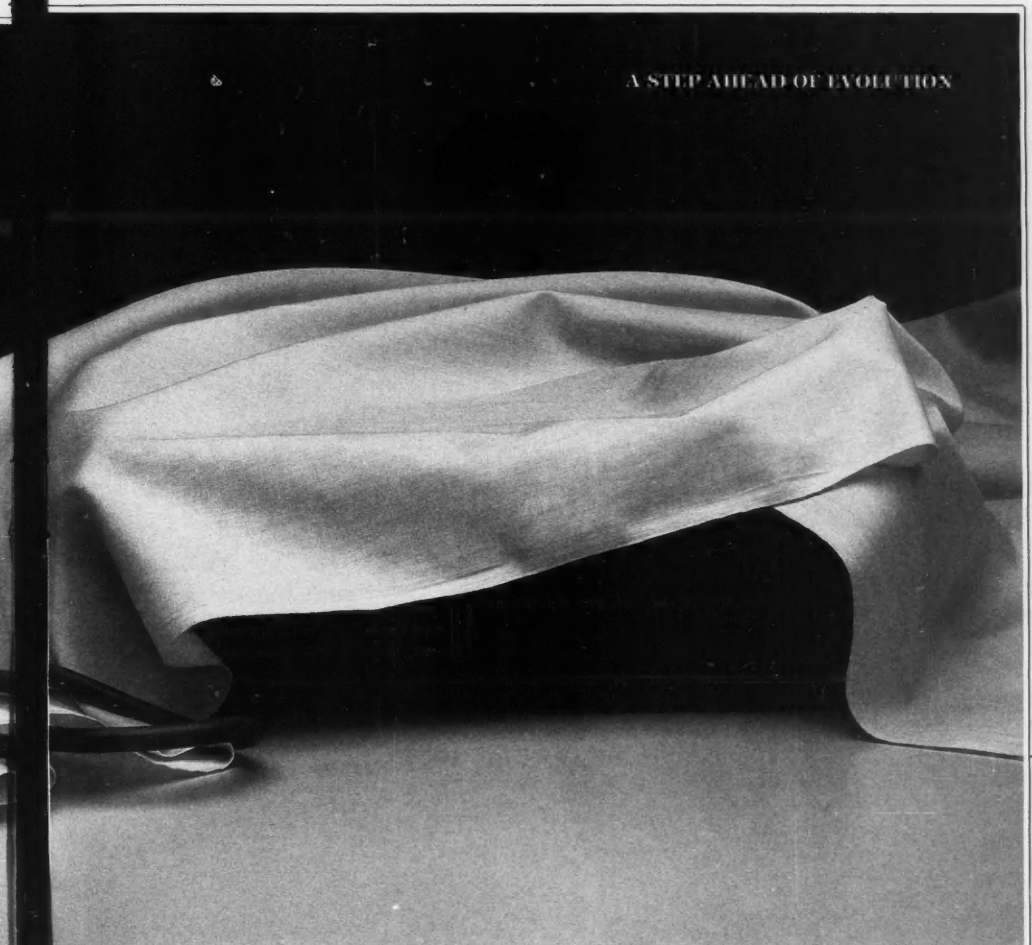
Other capabilities include microfilming and image-capture features that allow for maintaining audit trails; contextual, strip video data capture, which allows the selective capture of illegible charaters; and field video for data correction and completion.

Software available with the Tartan XP80 includes a Unix-based parameter-driven capture program and a menu-driven forms generator package.

An optional image-capture unit allows the system to read selected OCR fields and to capture selected front and back images from a form simultaneously.

Captured data can be transferred to local storage systems, including optical disks, data entry terminals or host computers.

The base price of the Tartan XP80 system, which is available now, is $285,000, the vendor said.



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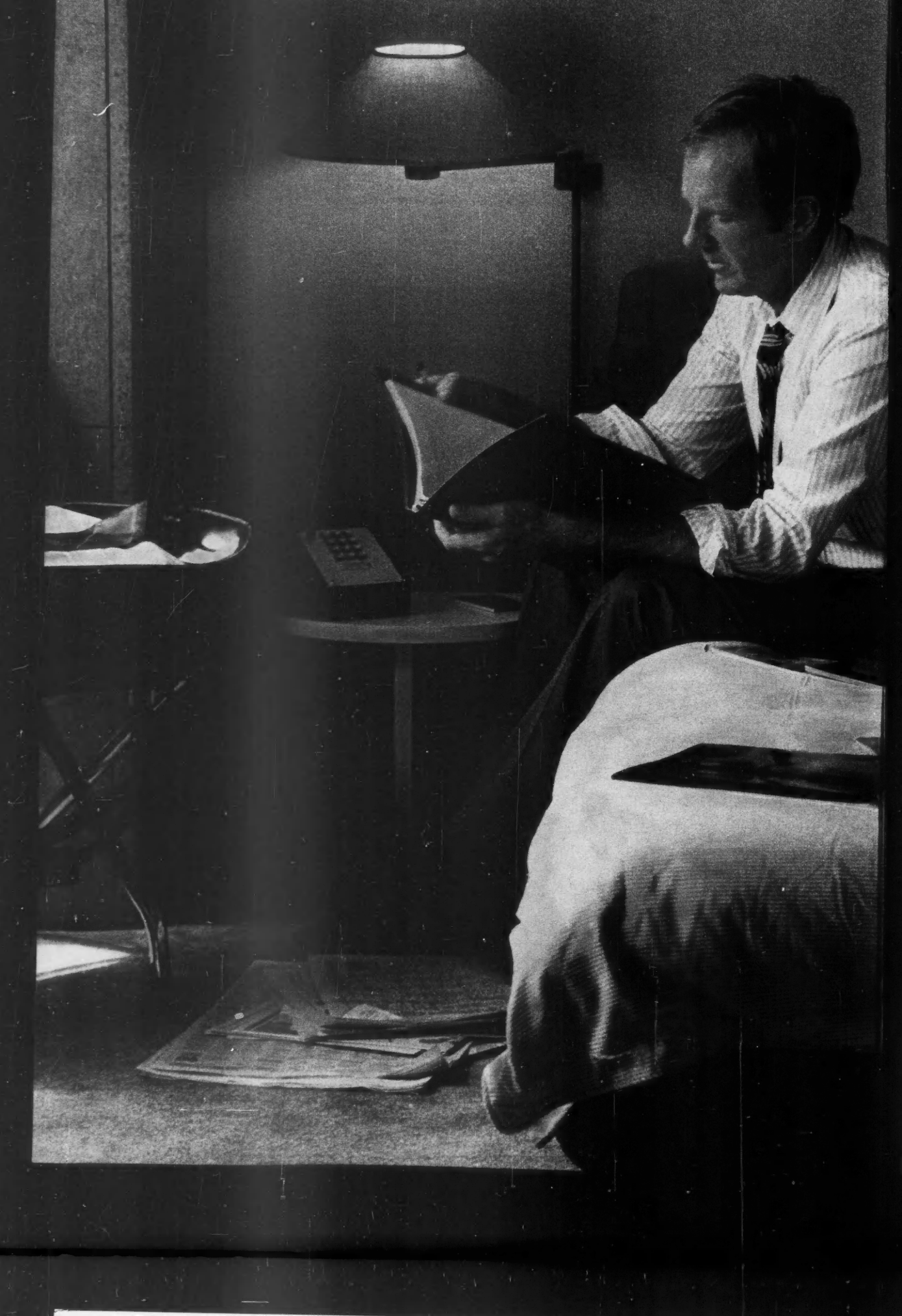

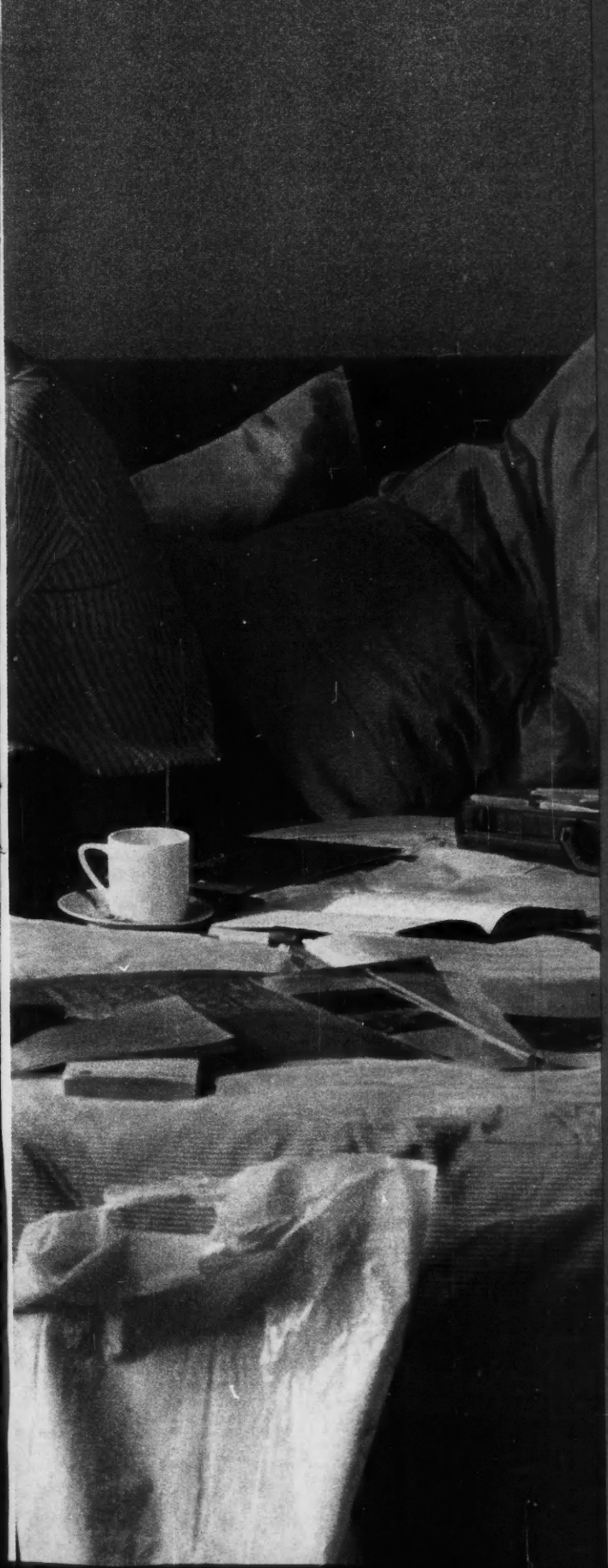

"After ten years of trade shows, you figure any real news about 3270s is going to come from IBM. Then somebody hands you a spec sheet that changes everything.

I can see he's excited, but all he says is, 'You won't believe this.' It seems that what IBM didn't do – AT&T's been doing for a year. Namely, connecting Sync and Async environments. Now all our guys who need numbers from the VAX down the hall and the 3083 at corporate don't have to hop back and forth between displays. Now they can get the numbers they need to close a sale while they've got a customer on the line. Booth 16-B hadn't been real high on my list. AT&T's booth. Now here they are playing in IBM's park. And hitting home runs.*

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NEW PRODUCTS

Processors

Force Computers, Inc. has announced **static random-access memory** (RAM) boards said to be compatible with VMEbus-based systems.

The 32-bit boards provide a 50-nsec access time for both reads and writes and support VME/Plus architecture for real-time multiprocessing. The VMEbus interface is compatible with the IEEE 1014 VMEbus standard. The boards support such data transfer modes as 24- and 32-bit addressing with 8-, 16- and 32-bit data.

A 512K-byte Static RAM-5 is priced at $1,990.

Force, 727 University Ave., Los Gatos, Calif. 95030. 408-354-3410.

Five microcomputer products based on the Multibus II bus architecture have been announced by **Micro Industries.**

The products include the **MIB II 186/170 Color Graphics Controller Board,** which provides 640- by 48- pixel resolution; the **MIB II 186/153 MIL-STD 1553 Communications Controller Board,** which provides a communications interface to the Military-Standard 1553B Avionics bus; the **MIB II 3202X Dual Channel Digital Signal Processor Board;** the **MIB II 186/152 8-Channel Serial I/O Controller Board,** which provides serial communications to such peripherals as terminals and modems; and the **MIB II 186/111 6-Channel Digital Controller I/O Board,** which provides 96 channels of parallel input and output.

The boards cost $3,000; $9,995; $7,500; $3,000; and $2,500, respectively.

Micro Industries, 691 Greencrest Drive, Westerville, Ohio 43081. 614-895-0404.

A VME system bus backplane called **VSB** that was designed for use in multiprocessor applications in 32-bit VME systems has been announced by **Mupac Corp.**

The VSB is available in two-, three-, four-, five- or six-slot configurations. According to the vendor, it features four-layer construction and is impedance-matched.

Also featured is on-board termination, the vendor said.

Prices start at $123.

Mupac, 10 Mupac Drive, Brockton, Mass. 02401. 617-588-6110.

A VME board set said to house a Motorola, Inc. 68000-compatible superminicomputer system has been announced by **Edge Computer Corp.**

The **Edge 2000 series** is a four-board set that uses custom-designed, high-density CMOS gate arrays.

According to the vendor, it incorporates a bus structure that offers 64-bit parity, a 128M byte/sec. system bandwidth, 60M bytes of aggregate I/O bandwidth and up to 1G byte of memory.

In addition, the product features transparent multiprocessor architecture and support for such industry-standard or proprietary secondary I/O buses as Multibus and VMEbus.

Four versions, accommodating from 500 to 1,000 users each, are available.

Pricing starts at $25,000 for a single processor at the board level with 8M bytes of memory.

Edge, 7273 E. Butherus Drive, Scottsdale, Ariz. 85260. 602-951-2020.

A two-chip set of VMEbus-interface gate arrays has been announced by **SBE, Inc.**

The **SBE VMEbus Interface Controller** (VBIC) and **VMEbus Slave Address Manager** (VSAM) chips are said to offer an implementation of the Revision C.1 VMEbus specification.

According to the vendor, they can be used individually or together to provide three configurations of bus-interface capability, supporting interboard communication architectures as dictated by application requirements.

The 144-pin VBIC contains a VMEbus requester, an interrupt controller, an interrupt generator, a daisychain driver, a bus arbiter and VMEbus times.

The 120-pin VSAM implements slave-address decoding, location monitor and mailbox functionality.

A set is priced at $395.

SBE, 2400 Bisso Lane, Concord, Calif. 94520. 415-630-7722.

Data storage

PMC Associates has upgraded its **ESDX** series 5¼-in. Winchester subsystem for Digital Equipment Corp. PDP-11 and VAX systems.

The enhanced small-disk interface subsystem comes with one or two drives featuring average access times of 16½ msec. The Unibus, or quad-wide Q-bus controller, supports up to four drives.

Standard performance features include a 1M-byte cache memory, up to 3M byte/sec. data transfer rates, dynamic bad-block replacement, self-diagnostics and block-mode direct-memory addressing.

A controller I/O panel allows switch-selectable configuration of single or dual controller operation.

Pricing starts at $5,566 for an unformatted 182M-byte single-drive version.

PMC Associates, 74 North Central Ave., Ramsey, N.J. 07446. 201-934-1835.

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COMPUTERWORLD

SPOTLIGHT

UNIX

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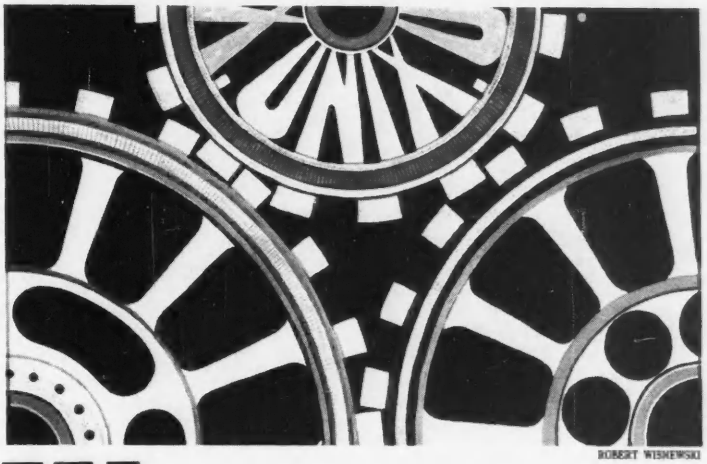
Convergence with operating systems in the information systems spectrum will allow Unix to join the corporate structure.

UNIX WORKS AS COG IN SYSTEMS

BY CLARE FLEIG



ROBERT WISNIEWSKI

When it comes to Unix, few in MIS take a neutral position. Some — primarily the operators at the 300 or so sites in the U.S. that have standardized on it — could not work without it. However, the bulk of this population takes the less bullish view that, while Unix may be all right for scientific and engineering applications and some niche markets, for the big jobs they would be more comfortable with time-honored systems running IBM CICS.

Before long, both sides will have to rethink their positions. During the next two to four years, Unix will more than likely become an established operating system in the corporate environment. This success, however, will arrive in a form that is considerably different from what its proponents envision. Its conquest will be one of assimilation rather than an overpowering of the existing order.

There is no question that Unix has thus far failed to capture a significant portion of the corporate operating system market, particularly at the mainframe and personal computer levels. Estimates indicate Unix-based systems account for about 3% of the PCs operating in business environments, as opposed to 86% running Microsoft Corp. MS-DOS, 5% running Apple Computer, Inc.'s proprietary operating system and 6% running other systems. The penetration rate of Unix is equally dismal in the mainframe environment. While a few hundred mainframe sites in the U.S. run Unix as the operating system of choice, in contrast, more than 25,000 sites run CICS under IBM's MVS, VM or VSE/DOS.

Where Unix has generally fared better is in the mid-range, with Digital Equipment Corp.'s VAX, AT&T's 3B series and turnkey systems from companies such as Altos Computer Systems and Sun Microsystems, Inc. spurring interest in its use for specialized departmental solutions.

For example, at Kidder, Peabody & Co., a New York-based brokerage firm, a Unix system supplied by Sun is used to track stock trading at the New York Stock Exchange. The Unix application program is used primarily to scan stock trades and identify instances in which a large gap between the value of a stock and its trading price exists. Once such pricing aberrations have been identified, Kidder Peabody then can use the same system to electronically make the indicated stock trades.

Paul Sobata, the vice-president in charge of the Kidder Peabody system, says the firm chose the system not because it was Unix-based but because it provided the best price/performance value. He says the firm made the choice in August 1986, when the IBM Personal Computer ATs that the department had been using began to run out of capacity.

A review of requirements indicated that the systems department needed multitasking. However, a move to a minicomputer-based system was not desirable because Kidder Peabody, which had standardized on the PC AT, wanted to stay

Fleig is director of systems research specializing in local-area networking and IBM communications for International Technology Group in Los Altos, Calif.

Cog

FROM PREVIOUS PAGE

with a PC environment. At the time, Sobata says, "IBM was talking about multitasking but wasn't able to provide it. The move to a workstation seemed like a logical next step" from the AT.

In fact, one key reason Unix has been able to obtain a foothold in the mid-range is IBM's well-publicized lack of success in locking up this level. Unix systems, particularly those capable of interfacing with IBM and DEC environments, have made strong showings.

For example, Altos, which built its business on turnkey systems for small and medium-size businesses, has begun to aggressively pursue corporate clients by providing IBM-compatible interfaces to Unix.

In 1986, it purchased Communications Solutions, Inc., a vendor providing IBM Systems Network Architecture (SNA) interfaces, from Control Data Corp.

Hopeful signs

There are also some indications that interest in Unix is beginning to pick up at all levels. While few MIS professionals are ready, willing or able to throw out their current operating environments to migrate to Unix, many are looking at ways in which Unix can be used as part of their systems infrastructures.

This new spirit of openness is developing chiefly as a result of three factors:

- The power and performance capabilities of the Intel Corp. 80386 microprocessor.
- Government endorsement in the form of request for proposals (RFP) that stipulate Unix compatibility.
- A growing set of applications that are Unix-based or have migrated from their original operating environment to Unix.

The power and performance available in Intel's 80386 microprocessor make it ideally suited to Unix application generation and use at the PC level.

Application development work that bogged down on a PC AT or compatible and was virtually impossible using an Intel 8088 microprocessor can be performed with ease in the 80386 environment.

This kind of power opens up the potential for a wide variety of applications to run in the Unix environment and also makes existing Unix applications run more quickly.

Many applications originally created for the 8088-based IBM PC family might have been hits instead of failures if the 80386 microprocessor had been available when they were written.

The federal government, in the meantime, has become a strong proponent of Unix, making Unix operating system compatibility a regular feature of many agency and department RFPs.

According to government proposal writers, the portability of Unix is a major factor in their decision to require it for government use.

"Applications portability — the ability to run an application regardless of the hardware — gives us an enormous edge in terms of reduction in training time," says an official of the U.S. Department of the Treasury, who asked not to be identified.

The Treasury, one of the first government agencies to standardize on Unix, currently employs more than 700 Unix systems of various types, including Zilog, Inc. minicomputers and systems from Altos, DEC and Pyramid Technology Corp.

> UNIX, WITH its hardware independence, is beginning to be tapped as a key element for certain system integration projects.

A second driving force in the Treasury Department's decision to move to Unix, the official says, was the operating system's unique suitability for competitive bidding situations.

"We needed to allow competition, and systems like VMS and VS were proprietary, so they had to be ruled out," he says, referring to DEC's and Wang Laboratories, Inc.'s operating systems, respectively.

The Treasury Department issued a formal RFP for a Unix-based system in 1983.

Other agencies facing similar competitive bidding regulations soon followed suit, and the trend toward Unix support in federal DP acquisitions was born.

That trend quickly spread to companies that handle large federal contracts, such as Boeing Co. and McDonnell Douglas Corp.

Influence on vendors

Government bidding requirements and their influence on major commercial companies have, in turn, stimulated vendors — including IBM — to provide support for Unix.

IBM is not now, nor is it ever likely to become, a Unix backer. However, with the federal government and more than a few large commercial customers demanding Unix, IBM has acquiesced to provide Unix support.

This support currently takes the form of IX/370 on its 370 mainframe and AIX for the RT Personal Computer.

Additionally, IBM has committed to making the transition between its mainframe and PC Unix versions easier for end users to handle.

Despite signs of interest and accommodation, Unix remains a hard sell in the corporate marketplace, both for mainframes and for PCs, with users of each type of system voicing a separate set of concerns and issues.

High-end obstacles

While Unix is readily available on mainframes, it is still not as accepted as a strong operating system alternative by most MIS professionals.

Their concerns, both technical and cultural, include the following:

- IBM market dominance.
- Systems architecture.
- Security and integrity.
- Applications base.
- Standards.

IBM. Corporate mainframes, characterized by batch processing, time-shared applications and, increasingly, on-line transaction processing, remain IBM's largest and possibly last stronghold.

While competitors' systems may take away from IBM's share of the minicomputer and PC markets, IBM remains securely in charge of the mainframe environment.

While IBM does offer some support for Unix on its mainframes and PCs, the company has never actively promoted Unix.

Quite simply, IBM's position has been that Unix is available for those who request it, but it is not a strategic product.

In recent months, however, IBM has taken a somewhat more active, positive stance in regard to Unix. With the increase in its federal government business and system integration activities, IBM has shown more willingness to provide Unix support, just as it has shown a willingness to support other de facto standards, such as Ethernet, if customer requirements dictate.

Architecture. An equally serious obstacle to Unix penetration at the high end is that Unix implementation often means displacing a system already in use and migrating applications and data bases that may have existed for years.

For an MIS director to willingly discard an existing system, the alternative must be able to offer significant advantages in applications usage, cost savings or reduced downtime. Unix has yet to prove that it can offer those trade-offs.

To date, mainframe Unix implementations have shown little potential to displace the venerable CICS for data processing tasks. CICS, with utilities like IBM's RJE, provides the ability to schedule work loads and time-sharing services.

These features are often not provided in Unix-based systems, despite the fact that this is a

Continued on next page

Fun and adventure exploring Xenix

BY STEVE EPNER

Bruce Tompkins is a Unix pioneer. An MIS manager at Cort Furniture Rental, Inc., a division of Mohasco Co. based in Fairfax, Va., he didn't set out to earn that distinction. It just happened that, in 1982, Cort needed a system that would run on a small computer with a true multiuser capability.

"There weren't many choices around," Tompkins says. "Unix-based systems were the only viable answer."

In 1982, however, using Unix or any of its derivatives meant blazing your own trails. Tompkins says, "It was impossible then to find anyone with working experience in Unix outside of AT&T or the West Coast."

What Cort chose was Microsoft Corp.'s Xenix operating system running on the Altos Computer Systems 2086 configured with 4M-byte memory and 80M- or 160M-byte drives. Altos provided the most cost-effective hardware at the time in terms of price/performance, he says.

Cort has already installed 33 systems, and as new locations are opened, each will be computerized.

Cross-level support

Cort is organized into four levels — corporate, region, district (or store) and showroom. Because each level has unique reporting requirements, any solution must support the needs of each level and provide communications up and down the line. For example, corporate personnel needed to be able to receive financial data from the regions and consolidate it into management reports.

Prior to the Altos solution, Cort used a combination of service bureaus and manual processing. Each region was charged with selecting a local bureau to process general ledger, accounts payable and payroll. At the store, everything was manual: Receivables used a one-write-type system with customer ledger cards, and district personnel were pulled together each month for a manual aging report.

Five years later, Tompkins says he feels good about the results of his explorations. The operating system, he says, has satisfied most of the company's initial requirements — that the system be easy to use, run on inexpensive hardware, allow multiple users and be flexible.

Epner is president of The User Group, a St. Louis-based management consulting firm.

In Cort's implementation, the operating system is invisible. Users access everything via English-language menus. With the Altos Office Manager menu shell facility, menus can be constructed that insulate end users from the complexities of the operating system.

Cort has implemented all of its systems using C and the Unify Corp. Unify data base. Tompkins says Xenix provided great programming support, and Script Writing, a function of Xenix, made work more automatic.

"There are lots of little things, too," Tompkins says. "Like being able to go to the end of a file with a single command. Anyone who has had to scroll through a long file knows what I mean."

> "THERE weren't many choices around. Unix-based systems were the only viable answer."
>
> BRUCE TOMPKINS
> CORT FURNITURE
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Portability was and continues to be an important issue. According to Tompkins, portability is not all it could be. He is currently evaluating a hardware upgrade and has found that even within a single-manufacturer product line, nothing is 100% portable.

This is a particularly thorny issue because Cort does not want to swap out all of the computers at once. To Tompkins, swapping means supporting two different versions of the software. No matter how close the systems are, any difference is a potential difficulty when a problem arises in the field.

Response time is another concern. "When the level of use is in an average range, we never get complaints," Tompkins says. "But when a district, especially one of the large ones, becomes busy, I am not sure I could ever satisfy them."

The space that the operating system takes is not a problem. Tompkins has been upgrading the operating system to stay current. As Xenix becomes more compatible with AT&T Unix System V, he says he hopes the portability issue will be resolved, noting that an ANSI standard would be a big help. •

Cog

FROM PREVIOUS PAGE

major consideration for MIS professionals.

Security. Security and data integrity in Unix, although improving, still lag behind what is offered by other operating systems.

Until recently, for example, Unix lacked even the rudimentary capability of file locking, let alone such features as access control lists, audit trail creation and monitoring and other optional access control and monitoring utilities.

Although AT&T Unix System V, Release 3 includes file locking, most MIS professionals believe Unix has a long way to go before it can match a typical DP shop's security and integrity requirements.

Standards. Although one of Unix's major claims to fame is its ability to operate across many different processors, the efforts of various Unix vendors to create file locking or security enhancements detracts from the operating system's portability.

That problem is currently being addressed by computer industry standards bodies — notably the Institute of Electrical and Electronics Engineers 1003.1 committee, writing the Posix standard for Unix.

In addition, the federal government, through the National Bureau of Standards (NBS), is scheduled to make its first move in January, when it issues a Federal Information Processing Standard for Unix system acquisition by federal agencies.

According to Roger Martin, manager of the software and engineering group at NBS, the guidelines, which are based on Posix standards, will cover three main areas:

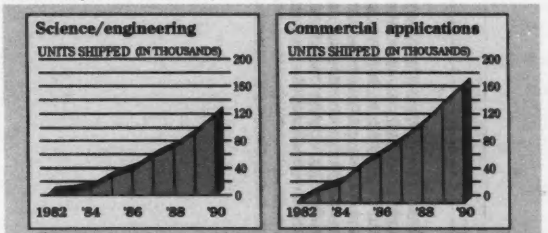
- A reference guide, or test sweep, to provide federal agencies with a uniform set of benchmarks for Unix systems.
- A specification for implementing the C language.
- A set of specifications for Unix shell and programming tools implementation.

The goal of the guidelines, Martin explains, is "to reduce areas of conflict in the portability of Unix applications and to define areas of commonality."

While the NBS standards are "law" only for federal agencies, Martin says he believes their existence will also increase the penetration of Unix in the corporate realm, both because they will provide a basis for system comparison and because vendors who build systems to meet government standards will offer the same products to commercial buyers.

Who's using Unix?*

Commercial applications are outstripping scientific/engineering applications, traditionally seen as a bastion for Unix users



* Units shipped to major commercial sites and government installations from 1982 to 1990

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CW CHART

Is 'good' enough?

When it comes to application programs, Unix faces still another test. The issue has nothing to do with number or variety of programs; in fact, the size of the Unix applications base has grown steadily in the past two years, and there are now plenty of good choices available.

The problem is that "good" may not be enough. To justify the cost and trouble of conversion or connection, MIS directors have to find in either Unix or Unix-based applications features that other operating systems and packages do not offer.

The official at the Treasury Department, for example, recalls having to go through "a real dance with a user who wanted a system that ran VMS because Unix didn't have the same set of features."

He notes that that kind of conflict puts an additional burden on the Unix purchasing process.

To their credit, many Unix vendors have recognized the need for extra value in applications. Unisoft Corp., for example, signed an OEM contract with Intel in July to develop a customized version of Intel's Fastpath 9750 CU/X communications controller.

Versions of Fastpath are in the works for IBM's IX/370 and Amdahl Corp.'s UTS, as well as systems from Hitachi Ltd., Unisys Corp., CDC and Cray Research, Inc. The product has been designed to provide support for asynchronous terminals in a Unix environment.

Such an approach represents a big step in the right direction for Unix vendors and increases the potential for growth in the mainframe Unix marketplace.

The PC perspective

While MIS professionals have one set of concerns for the mainframe environment, they have another set of issues for PCs. As with mainframes, the key concerns are capability, trade-offs and cost.

Prior to the introduction of Intel's 80386, Unix application development and use was constrained by the limitations of the 80286 chip, a technical situation that caused many Unix developers to opt for the non-IBM-compatible Motorola, Inc. microprocessor family.

Motorola 68000 microprocessors were used in systems by Altos, Fortune Systems Corp. (an early Unix system vendor now owned by SCI Co.) and others.

These systems tended to be classed as supermicros because they used configurations similar to those found in the minicomputer environment.

Stand-alone systems pioneered by AT&T, with the Unix PC (also known as the PC 7300), and Hewlett-Packard Co. that were aimed at business had little market appeal.

IBM half-heartedly provided its own version of Unix for its PC AT. Successful Unix-based stand-alone systems from companies like Sun and Apollo Computer, Inc. were sold as workstations and targeted primarily at the scientific and technical markets rather than at general business.

For the most part, general business users were not interested in Unix. Xenix, Microsoft's Unix derivative, developed a small following, especially among supermicro vendors that liked it for its multiuser and multitasking capabilities.

However, the overall market share for Unix and Xenix remained small for two key reasons — the entrenched base of MS-DOS applications and systems and the Unix programming environment.

Software developers logically would choose to write for the operating system that dominated the market. This set up a familiar catch-22 situation: There were not enough Unix systems installed to encourage developers to write programs that would run under Unix.

The lack of aggressive software development dramatically reduced the chances of a "hit" package like 1-2-3 coming on the market and making Unix system sales take off.

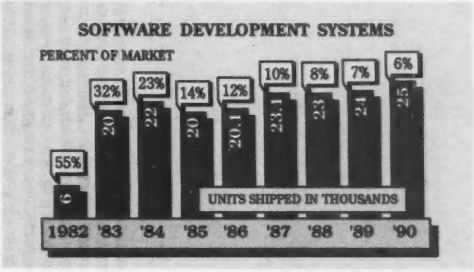
Complicating the situation was the fact that early versions of Unix, especially System V Release 2, possessed few features designed to protect users from the pure programming environment.

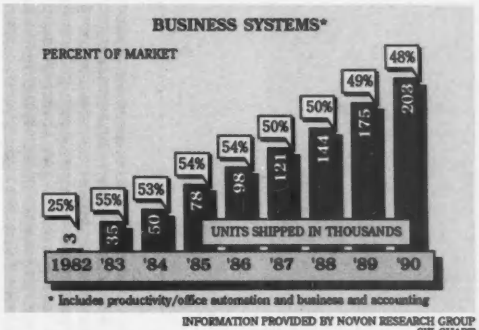
While experienced Unix users regarded this lack of adulteration as an advantage, the rest of the world felt differently.

To function acceptably in the PC environment, Unix must be enhanced, either in a subsequent release of the operating system or through program support, to protect inexperienced users who might mistakenly exit into the Unix programming environment. For a long time, that fact alone was enough to discourage MIS and microcomputer managers from putting Unix systems on office desks.

The growth in Unix business systems

Software developers built a base from which business users could take off; by 1990, shipments of Unix systems for business applications will eclipse shipments of software development systems 8-to-1





* Includes productivity/office automation and business and accounting

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The advent of the 80306 microprocessor may, however, cause many to rethink their earlier dismissals of Unix.

The power and performance of the 80386 not only provided enough memory and speed to make an operating system like Unix viable for key applications, but it also required a new operating system approach.

In fact, only Unix and IBM's OS/2 offer the capability necessary to make 80386 microprocessors fully functional.

A functional operating system for the 80386 microprocessor requires both single- and multiuser applications support. In addition, it must offer multitasking as well as 32-bit memory management and networking capabilities. Finally, it must be able to support dual operating systems.

A look at the three top operating system contenders illustrates that only OS/2 and Unix are capable of providing all six functions.

MS-DOS, the standard of the 16-bit operating environment, offers only three of the six functions: single-user operation, multitasking and network support.

Dual operating system support is available only through add-ons, such as Locus Computing Corp.'s Merge 386.

These limitations, in addition to IBM's strong support of OS/2, mean MS-DOS can be ruled out as a primary operating system in the 32-bit world, except where required to provide short-term applications migration and compatibility. IBM's PC-DOS 3.3 is targeted to fulfill that function in the IBM environment.

Revising the forecast

In many early growth scenarios, Unix suddenly comes into its own in the corporate environment, with MIS and PC end users realizing the advantages to be gained by using Unix and happily migrating to it from CICS or PC- and MS-DOS. Even the most enthusiastic Unix boosters now admit, however, that such a picture is unlikely.

Unix is not going to replace the entrenched base of either MVS or VM in the mainframe environment or MS-DOS and the emerging OS/2 at the low end. Pure Unix, as it has been known in the scientific and engineering marketplace, will not emerge as a mainstream

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corporate operating system.

What is much more likely is that Unix will become integrated with the corporate mainstream, converging with MS-DOS capabilities at the low end of the computing scale and with VM (in the IBM environment) at the high end. This convergence will take two primary forms: application convergence and system integration.

Application convergence — the ability to run applications written for either MS-DOS or Unix (and eventually OS/2) — is achieved by supporting dual operating systems in one system. Several major vendors have already taken steps in this direction.

In January, Microsoft teamed with developer Interactive Systems Corp. to develop a version of Unix System V Release 3.0 for the 80386. In February, AT&T entered the picture with an offer to merge Xenix and Unix System V Release 3.0 into a single Unix-based operating system for the 80386.

Today, there are five key players in this market — AT&T, Microsoft, Interactive, Phoenix Technologies Ltd. (the OEM responsible for many vendors' IBM ROM BIOS compatibility packages) and Locus.

The products developed by these companies, separately and in joint development projects, should provide the Unix operating system the impetus it needs to gain a foothold in the microcomputer market by the end of 1988.

Teaming up seems to be the preferred course of action within this group. Interactive and Phoenix, for example, have jointly developed VP/IX, a Unix-based operating environment that runs MS-DOS as a task under Unix. This kind of product provides the essential missing link — dual operating system support — needed to make Unix fully functional in the 80386 environment.

With Microsoft and AT&T's Unix/Xenix truce negotiated, the major remaining battle is between the two companies vying for leadership in providing the key interface for an MS-DOS- and Unix-based program operating in the 80386 environment. The contenders are Interactive and Phoenix's VP/IX interface and Locus's Merge 386 programs.

At present, that battle appears to be at a standoff, with both Interactive and Locus in strong positions. IBM is supporting development efforts for both companies through joint development activities. Other third-party vendors are making their choices. Prime Computer, Inc., for example, recently signed an OEM agreement with Locus for Merge 386.

Such dual operating system support packages are key to the overall integration of Unix into the corporate environment. Large corporations increasingly face the need for systems integration to create a support structure for all automated functions in the corporation.

In this type of a systems integration project, two key considerations are the project team, typically made up of a prime contractor and several subcontractors, and the integrating elements, often a communications network and set of software applications.

Unix, with its hardware independence, is beginning to be tapped as a key element for certain system integration projects. In these large projects, Unix-based systems become an element to be integrated, along with Ethernet, Open Systems Interconnect and CCITT X.25 standards, to create the corporate infrastructure.

ONLY Unix and IBM's OS/2 offer the capability necessary to make 80386 microprocessors fully functional.

For instance, a department using Sun Unix-based workstations would require an interface to the corporate data base. With that interface implemented, the Unix-based systems become part of the corporate mainstream, despite the fact that they continue to be located in the engineering section and run engineering-based applications.

Marriages of convenience

The requirements for creating this kind of integrated framework are already evident in the teaming and acquisitions happening in the Unix-based vendor community.

A key example of this trend was Altos' purchase of Communications Solutions earlier this year. Communications Solutions, best known for its SNA development expertise, now belongs to a company best known for turnkey Unix systems.

The ill-fated merger attempted by Convergent Technologies, Inc. and 3Com Corp. was yet another attempt to provide this kind of synergy. Convergent now offers its own Unix-MS-DOS interface product, PC Exchange/Vines.

In February, Unipress Software, Inc. created a porting division specifically to port C language applications and systems software running on MS-DOS, VMS or a single Unix system to a variety of Unix-based systems. Even Apple recognizes the need to support Unix as well as MS-DOS on its Macintosh II.

Unix may never achieve the position in the corporate marketplace many of its enthusiasts envisioned, but neither will it be completely isolated from the mainstream. Unix systems, from the PC to the mainframe, are being integrated into the corporate infrastructure in increasing numbers; this trend will continue to build steadily, well into the 1990s. ■

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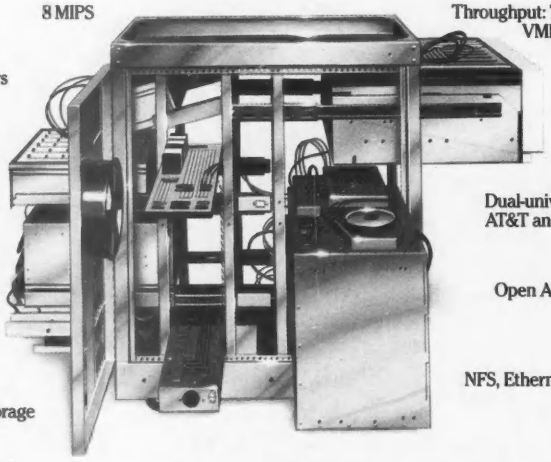

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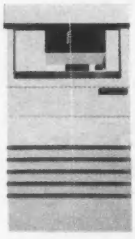

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Unix breaks deadlock

BY TIM O'REILLY

Ethernet, Token-Ring, Starlan, Appletalk, RS-232, TCP/IP, UUCP, NFS, Decnet, SNA, SNADS, LU6.2, Netbios, Netware, OSI ... Once there were no networking standards, and now there are too many, which amounts to the same thing.

Since it appears there is no clear winner in the "standards wars," user interest has shifted to searching for a Rosetta stone of sorts, a system that can translate among the competing protocols and transport media so that users can get on about their business. And there is good reason to believe that this sought-for translator may be Unix.

Unix's strongest suit has always been program development, but it also has some secondary strengths, one of which is communications.

The first, and still most widespread, Unix communications tool is a set of programs collectively referred to as UUCP, after the flagship program in the set, Unix-Unix Copy.

Originally developed at AT&T Bell Laboratories in 1976, UUCP consists of both an underlying protocol for error-checked file transfer and programs for exchanging electronic mail, transferring files between systems and executing programs on remote machines. A related program, called CU, allows users of one Unix system to remotely log on to another system.

UUCP was originally developed to work on telephone lines and, later, direct serial (RS-232) connections between computers. At this point, it also runs on Ethernet local-area networks (LAN) and CCITT X.25-based packet-switching networks. This tool has two drawbacks: It works only between Unix systems and is too slow to keep up with the higher speeds of modern networking technology.

The UUCP protocol allows a maximum throughput of about 9K bit/sec., regardless of the speed of the underlying transport medium. Many implementations of UUCP now provide a non-error-checked protocol for high-speed pass-through on reliable links like Ethernet and X.25, which do their own packetizing and error checking.

In the scientific and engineering communities, most Unix systems are networked using Transmission Control Protocol/Internet Protocol (TCP/IP) on Ethernet, rather than using UUCP. TCP/IP is the language of what is probably the world's largest computer network, the Defense Data Network (DDN), used by the U.S. Department of Defense and its contractors. It is also the language of the Advanced Research Projects Agency Network, or Arpanet, used by researchers on contracts sponsored by the Defense Advanced Research Projects Agency, or DARPA.

However, UUCP is still almost universally used in the Unix community to connect to remote systems over telephone lines. Many Unix sites belong to an informal group known as Usenet, which uses UUCP to transfer mail and thousands of user-submitted news articles among more than 6,000 sites worldwide. Gateways exist between Usenet and the DDN, and mail and news articles are often transferred between systems.

Living in the business world

In the business world, both UUCP and TCP/IP are foreign languages. At the low end, the market is dominated by personal computer networks from vendors such as Novell, Inc. and 3Com Corp. — which between them own about 60% of that market. At the high end reside proprietary networking solutions like Digital Equipment Corp.'s Ethernet-based Decnet and IBM's Systems Network Architecture (SNA).

> UNIX'S strongest suit has always been program development, but it also has some secondary strengths, one of which is communications.

Despite IBM's attempt to set a low-end standard with its Netbios protocol, most PC networks do not communicate with each other or with systems other than PCs. Nor does IBM's SNA provide a full-range connectivity solution.

Because of IBM's dominance in the industry, anything it does is a de facto standard. However, not all essential SNA facilities are available on all IBM systems. For example, SNA Distributed Services (SNADS) for transferring E-mail and editable documents is offered under MVS as a part of IBM's Distributed Office Support System (Disoss) and on System/36 and 38. VM users have IBM's Professional Office System (Profs), which is not compatible with SNADS.

Decnet may well be the preferred solution for integrating large and small systems into a relatively seamless network. Decnet is primarily used to connect DEC's own product line. But Decnet/DOS allows PCs to connect with Decnet, and DEC's recently released Mailbus links its All-In-1 integrated office product, SNADS, Disoss and the CCITT X.400 mail standard, widely used in Europe.

In addition, third-party vendors like Soft-Switch, Inc. offer gateways between Disoss and Profs, as well as All-In-1 and similar integrated office products from Hewlett-Packard Co., Novell and 3Com.

Gateway to foreign worlds

Nonetheless, Unix systems play an increasingly important role as gateways between otherwise incompatible networks. For years, people have been saying that Unix is uniquely positioned as a communications hub. Even a quick look at the product offerings of Sun Microsystems, Inc., a market leader in both technical workstations and Unix connectivity products, will quickly reveal the truth of this statement.

Sun's Network File System (NFS) is offered by more than 100 vendors, allowing unlimited file sharing by systems ranging from PCs to supercomputers.

The PC version of NFS is based in part on a product called PC-Interface, developed by Locus Computing Corp. PC-Interface is now available from a number of Unix vendors. Using the product and its companion program, DOS/Unix Merge, a PC running DOS can store a program like Lotus Development Corp.'s 1-2-3 on a Unix file server and run it from there. E-mail, file transfers, print spooling and so on are all handled transparently by one or more Unix servers on the network.

Both PC-Interface and the PC version of NFS run on Ethernet, although PC-Interface will also work with PCs connected to a Unix system via RS-232 links. They are not currently compatible with LANs from 3Com and Novell, and their PC market penetration relative to these industry leaders is small. However, when PC-only LANs reach their limit, Unix-based networks are just hitting their stride.

An apple for every network

In this connection, you cannot entirely ignore the significance of Sun's recent acquisition of Centram Systems West, Inc. (now TOPS), developer of the TOPS network, which runs over Apple Computer, Inc.'s Appletalk.

Unlike most PC networks, which generally require additional hardware and software, Appletalk is built into every Macintosh sold. This means that as the Apple Macintosh penetrates business, so does Appletalk. Appletalk cards for PCs are now available, as are Appletalk-to-Ethernet gateways. TOPS thus makes possible file and printer sharing and other communications services between PCs, Macintoshes and Unix-based systems.

NFS does not run on IBM mainframes, either — unless they run Unix — but Sun's Sunlink family makes it possible to communicate directly with programs on a mainframe using IBM's Advanced Program-to-Program Communications (APPC) Facility, and to exchange documents with Disoss. Similar connections to Decnet are also available, as well as a migration path to evolving Open Systems Interconnect (OSI) standards such as Manufacturing Automation Protocol and Technical and Office Protocol.

Interactive IBM access with 3270 terminal emulation over Binary Synchronous Communications or SNA channels as well as batch access with IBM's RJE are also supported. Rather than equip PCs with individual 3270 connections, it is possible to hook them asynchronously to the Unix system and run multiple 3270 sessions in pass-through mode from there.

Of course, the real frontier in networking is not just connecting different systems, it is getting them to work together. E-mail, file and data transfer and network print spooling are just the beginning. As networking evolves, we can expect to see more distributed applications, in which not only data but also computation is distributed across different systems in a network. As companies begin to develop applications for APPC (LU6.2), they will find Unix systems ready and able to communicate with them. •

O'Reilly is president of O'Reilly & Associates, Inc., a technical-writing consultancy and publisher of the Nutshell handbooks on Unix in Newton, Mass.

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Posix increases portability potential

BY HARVEY WEISS

Unix offers three choices to users who want application software portability: the AT&T-developed Unix System V operating system, the AT&T-developed Unix System V Interface Definition (SVID) interface and the IEEE-sponsored interface known as Posix.

For many on both the vendor and user sides, major reasons exist to opt for Posix.

Posix, developed by the Institute of Electrical and Electronics Engineers, is a standard that represents the interests of concerned users and vendors, including AT&T. This is not the case with either Unix or SVID and may not be so in the future, since both belong to AT&T.

Posix offers an advantage because it allows an operating system to be optimized for different hardware architectures. The idea that you can port an operating system from one piece of hardware to another is correct, but the penalties on efficiency and throughput may be great.

Operating systems house built-in details of a computer's architecture. While one side of the operating system talks directly to the hardware, the other side is presented to users. The operating system's job is to simplify programming by shielding users from hardware details.

What the user needs — and what the IEEE is standardizing on with Posix — is the interface between users and the operating system. Any operating system can run under the Posix interface, and applications connected to Posix are portable because they deal only with Posix and are not dependent on the operating system below it. Consequently, the underlying operating system can be optimized for particular hardware to provide maximum performance and endurance.

No rewrite

Posix also makes it possible to switch underlying operating systems without rewriting applications. This is particularly important when making fundamental hardware changes, such as moving to a different architecture and considering hardware architectures not yet developed.

The optimization potential and robustness that Posix offers is also vital for real-time and data base operations, for which response time is critical.

With Posix, you can use tools and utilities originally developed for any operating system, once they can communicate with the standard Posix interface. This is important when Unix is under Posix. Unix was not designed as a production operating system, and many implementations lack the tools and utilities that traditional production operating systems offer. Production-oriented tools and utilities also do not exist under SVID because that interface is hardware-specific.

Hardware dependency

SVID is an operating system interface and, therefore, provides greater portability than Unix. However, it is based on a description of AT&T's Unix System V, Release 3, which, in turn, works best with 3B2. This hardware dependency becomes a problem if the architecture of the machine on which the underlying operating system will run is very different from that of the 3B2 or if there are implementation concerns such as security.

SVID is more comprehensive than Posix because it includes more features, utilities and other details. But for portability, this inclusion can be a disadvantage. The more comprehensive an operating system or interface is, the more specialized — and less portable — it will be.

The Posix interface standard is a major step toward application program portability, but it may not be enough. Portability cannot be achieved unless application developers design and maintain their applications with portability in mind. •

Weiss is vice-president, Government Systems Group and U.S. Operations, for Digital Equipment Corp. in Merrimack, N.H.

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Detroit	9/16, 10/15, 11/10, 12/9
Hartford, CT	10/6
Houston	11/6
Indianapolis	11/5
Los Angeles	8/3, 9/14, 10/28, 11/18, 12/8
Menlo Park, CA	11/5
Memphis	10/22
Minneapolis/ St. Paul	10/29
New Orleans	10/14
New York City	8/5, 9/16, 10/14, 11/18
North Jersey (Woodbridge)	8/19, 11/5, 12/2
Philadelphia	10/6
Phoenix	11/4
Pittsburgh	10/8
Portland	10/6
Raleigh, NC	10/27
Salt Lake City	10/15
San Francisco	8/5, 9/16, 10/14, 11/18
Seattle	8/7, 9/9, 10/7, 11/5, 12/2
St. Louis	10/20
Tampa	10/7
Washington, D.C.	8/7, 9/9, 10/7, 11/5, 12/2
Canada	
Montreal	10/19
Ottawa	10/20
Toronto	8/19, 11/5, 12/2
Vancouver	10/8
International	
Bonn	10/16
Frankfurt	10/15
London	10/13, 11/13, 12/3
Munich	10/6, 11/9, 12/1
Paris	10/8, 11/11, 12/2

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Boosting audience appeal

BY JUDITH HURWITZ

Although Unix systems have a long way to go before they reach the leading edge of user-interface technology, there are signs that the times are indeed changing.

These indications come from several fronts. Apple Computer, Inc. is planning to introduce a Unix-based Macintosh interface for the Macintosh II. Unix workstation vendor Apollo Computer, Inc. is allowing access to the source code for its Open Dialogue Unix-based user-interface design tool. And an assortment of user interfaces that integrate Macintosh-like interfaces for Unix are available.

Why the sudden interest in developing an easy-to-use interface for Unix? After all, the operating system has existed for two decades without anyone caring about ease of information access.

The answer is that the audience for Unix has shifted. While Unix was once relegated to the scientific and engineering communities, in which the user interface was a mere annoyance, Unix applications are beginning to find their way into the commercial environment, where users demand simplicity and ease of use.

Apple's challenge

Apple's Macintosh interface has become an increasingly important standard for measuring usability. Many of the products coming onto the market are taking a lesson from the consistency and simplicity of the Mac. Merging the multiuser nature of Unix with the Mac interface presents an alluring prospect.

Before Apple introduced the Macintosh II, some in the industry hoped Apple would be able to take a giant leap forward by demystifying Unix. Unfortunately, creating such a link between the Mac environment and Unix was more complex than Apple anticipated.

In time, Apple will be able to deliver this powerful combination. Ironically, Apple founder Steven Jobs' new company, Next, Inc., intends to put a Mac-like interface in front of Unix next year. In the meantime, while some wait patiently to see when Apple will pull it off, a few vendors have a head start.

The push is on

Judging from Apple's experience in uniting the Mac and Unix, the task will not be easy. Some companies have resorted to creating paths between the Mac and Unix machines as opposed to having the Mac-like interface directly on the machines.

Lutzsky-Baird, Inc., a 4-year-old software company, has successfully merged Unix, office software, the Macintosh and the IBM Personal Computer via networking software and a Mac-like interface. A Mac or a PC user would be connected to a Unix "hot box" via Apple's Appletalk and then to Ethernet via a gateway.

MANY products are taking a lesson from the consistency and simplicity of the Mac. Merging the multiuser nature of Unix with the Mac interface presents an alluring prospect.

Through this gateway, the PCs and Macintoshes are connected to the Unix system. When users select an icon, they are actually talking to the Unix engine. Lutzsky-Baird's software creates a virtual disk for each user. While users believe they are working on the Mac or the PC, the Unix machine translates the icon into a Unix command, which is then executed.

Like Lutzsky-Baird, Eurosoft International, Inc., a Saratoga, Calif., software firm, has united the Macintosh and the Unix operating system via a network based on Appletalk to Ethernet and then to the Unix host. Similarly, its product, Macnix, provides a set of icons to execute Unix commands. Eurosoft's emphasis is on networking and allowing the Mac to act as a Unix workstation.

Chelmsford, Mass.-based Apollo has opened its proprietary user-interface creation tool, Open Dialogue, offering source code to any vendor wishing to use it to create a user interface. The tool can be used to create a common graphical user interface across hardware platforms within a networked environment.

Apollo claims this is the first commercially available product built on the X Windows system, the MIT-developed windowing standard intended for Unix workstations.

Like the Lutzsky-Baird software, Open Dialogue can be used to generate icons to execute complex Unix commands. Developers can produce a common graphical user interface across applications and for different Unix hardware platforms.

Apollo will license the source

Continued on page S12

Hurwitz is news editor of "Unix in the Office," a monthly research report published by Patricia Seybold's Office Computing Group in Boston, for which she is a consultant.

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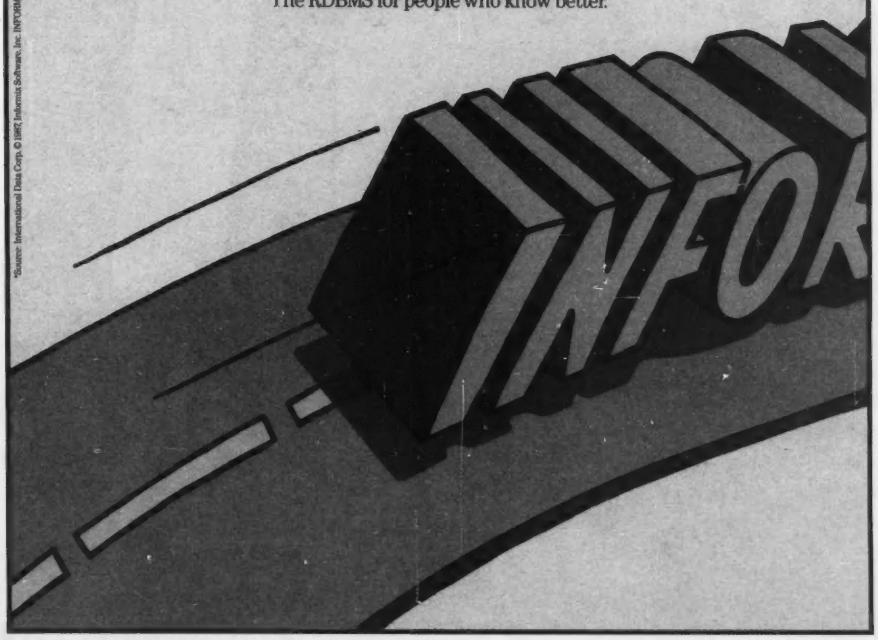

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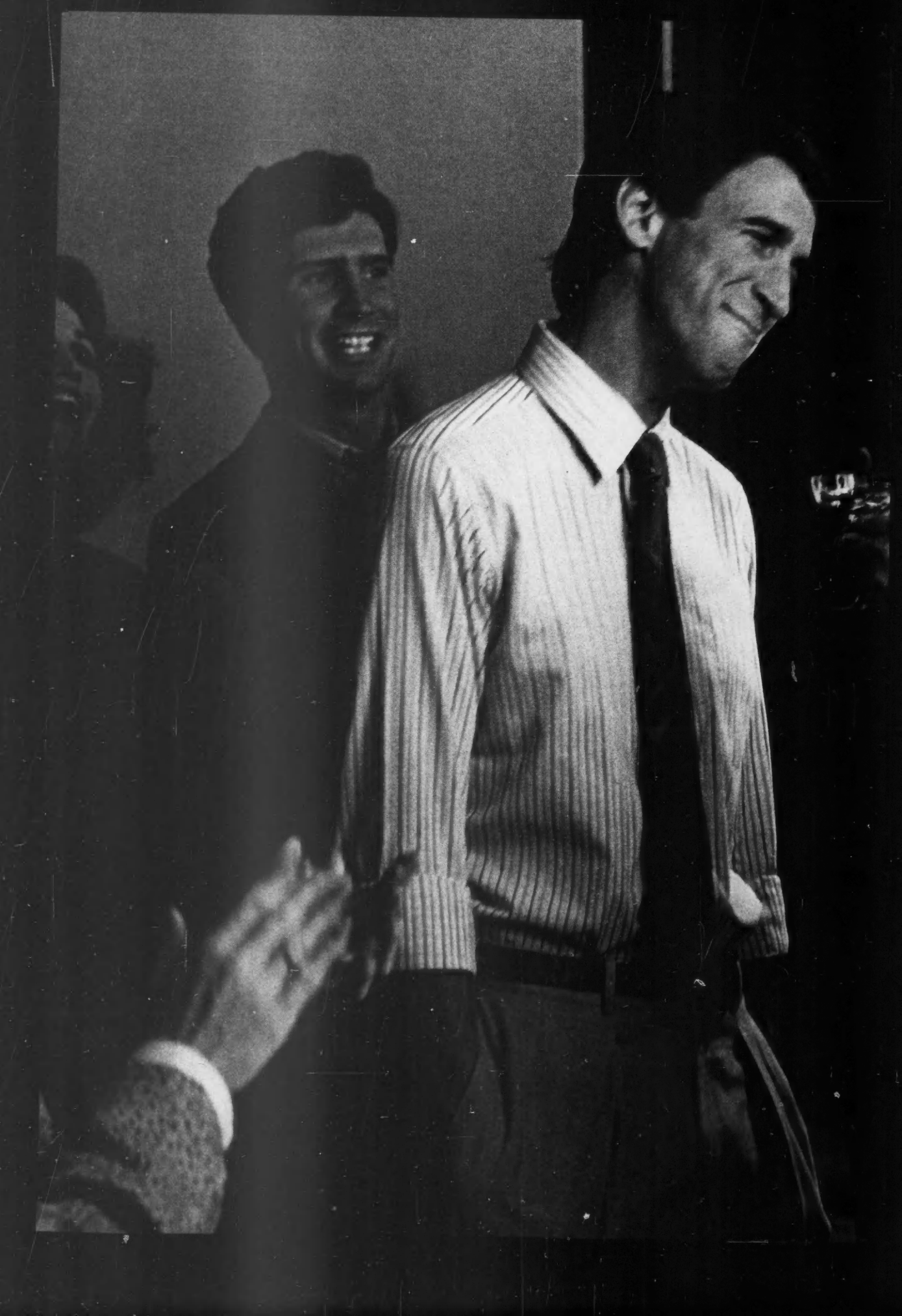

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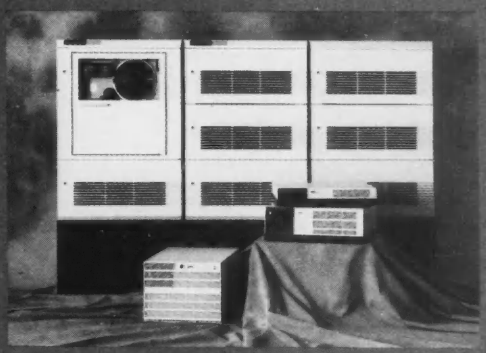

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The right choice.

Unix joins the establishment

BY BRIAN BOYLE

The idealism of the 1960s continues to give way to the pragmatism of the 1980s. Now, even the Unix operating system has gone commercial.

Not only has this research-oriented creation of the late '60s sold out to the stodgy world of business, industry and government, but it has also sold well, with nearly 175,000 commercial systems installed at major sites across the U.S. at the end of 1986 and sales of more than $2 billion expected this year.

What is more surprising is that, despite its heavy-metal technical reputation, this once surly offspring of AT&T Bell Laboratories has managed to sell nearly twice as many systems into office automation, text processing, data base management and traditional DP markets as it ever did in science and engineering.

To the casual observer, Unix systems are characterized by almost cryptic terseness. The general impression users often get from Unix is that its sole mission is to ensure that the system — of the programmer, by the programmer and for the programmer — shall not perish from the earth.

Coming into its own

Times change, however, and so do popular myths. The truth is that acceptance of Unix in traditional, Fortran-oriented scientific and engineering applications is as recent as the rise of technical workstations, multiprocessor architectures and industrial-strength graphics supported by a common Unix platform.

What Unix excels at is not the crunching of numbers but rather the manipulation of text — the more complex and structured, the better. Furthermore, this same text-processing strength has made Unix systems increasingly prevalent in text retrieval, electronic mail, multiuser small-business DP and specialized departmental business applications.

The earliest uses of the Unix system at Bell Labs were by high-powered software developers, who used its mathematically elegant design to build what is by far the world's largest and most complex computer network — the telephone company. The first true operating system portability was made possible by the complementary high-level C language, in which the Unix system was written.

With the advent of inexpensive very large-scale integration CPUs, practically anybody could design and build a complete computer system if they could get their hands on a proportionally cheap, off-the-shelf operating system. Although released more as an experiment than a product, Unix was the answer to a developer's prayer.

Soon, people began to notice that the same operating system running on the Onyx system — a Zilog, Inc. Z8000 microprocessor hosting established Basic accounting packages by emulating a minicomputer — was running a full-size Amdahl Corp. mainframe. This recognition ultimately triggered the Unix explosion of 1983, when the total installed base of Unix systems quadrupled. Companies from Altos Computer Systems to Zilog exploited personal computer-driven economies of scale to produce "the multiuser personal system" — potentially the business computational equivalent of the private automobile.

> ALTHOUGH released more as an experiment than a product, Unix was the answer to a developer's prayer.

A substantial portion of these early systems were consumed by software developers eager for an affordable development system, thus laying the foundation for a subsequent wave of new products.

In with the tide

When Unix first penetrated the business market, it did so without fuss or fanfare as the foundation for small-business accounting, basic word processing and data base applications.

The archetypal 1983 system was an Intel Corp. 8086-based Altos 586 running Microsoft Corp.'s Xenix, hosting an Informix Software, Inc. data base management system, a Horizon Data Systems word processor and accounting packages from Open Systems, Inc., written in the RM/Cobol language. However, some users surveyed that year had never heard of Unix — they only knew they were running a word processor that worked just like a Wang Laboratories, Inc. machine, only cheaper.

Scientific and engineering applications, for which Unix was once unjustifiably noted, began to crop up only in 1984 and '85. Most of these applications could not simply be ported from existing platforms. They had to be invented — or at least heavily customized and optimized — for the Unix environment.

Performance pressure

The intrinsic demands for performance and functionality of most technical applications pushed Unix into more specialized niches, variations that frequently eschewed the name as well as the snail-like reputation of typical Unix versions.

Fortunately, sufficient performance was offered by the now standard University of California at Berkeley Unix 4.2, developed for the U.S. Department of Defense Advanced Research Projects Agency by Berkeley in the early 1980s.

Currently, only three variants of the Unix operating system are readily available:

- AT&T Unix System, V Release 3, as defined by the System V Interface Definition.
- The feature-rich Unix 4.1, 4.2 and 4.3 University of California at Berkeley distributions for large technical shops and further implementations.
- The light, smooth Xenix implementation from Microsoft with technical assistance from the Santa Cruz Operation and marketing help from Interactive Systems Corp.

Ultimately, we expect only Unix System V and its descendants to remain, with a blend of Xenix and Unix 4.2 attributes for specific markets. The true standard interface as defined by Posix — more formally, the Institute of Electrical and Electronics Engineers' 1003 Standard for Portable Operating Systems — is now in the final stages of formal acceptance.

But where is commercial Unix going, and why has it taken so long to significantly and visibly affect the business community? If we examine the sum of the underlying forces, we see the result of successive waves of development — first the labs, then the gurus, then the entrepreneurs, next the technologist and, finally, the independent software developers — that constituted a $465 million business in 1986.

The largest players in this market are still the traditional systems houses. But while the days of Unix-porting are far from over, standardization is pushing these players closer to the actual market — functionally demanding users.

This is the real light at the end of the tunnel — end users with sophisticated and complex problems seeking sophisticated yet simple solutions that can be trusted to meet them more than halfway. •

Boyle is director of research for the Novon Group, a Berkeley, Calif., consulting, research and publishing organization.

Receiving line lengthens for business applications

BY ROGER SIPPL

Unix is an excellent software development environment and, now, the best environment for running business applications as well. Supermicrocomputers, minis and superminis running Unix allow the transportation of MIS applications across machines of different sizes and, if need be, different vendors.

Because of its wide availability on a variety of machines, Unix has become the ideal operating system in which to develop data base applications. Unix is the primary — and in most cases the only — operating system running on popular mid-range machines from such vendors as AT&T, NCR Corp. and Altos Computer Systems. What is not as well known is that Unix has been running successfully on larger machines, such as some Amdahl Corp. machines, the Digital Equipment Corp. VAX series, IBM's 4300 and 9370 and Unisys Corp. machines.

In the next decade, computers will run six major operating systems: Microsoft Corp.'s MS-DOS, IBM and Microsoft's OS/2, Unix, DEC's VMS and IBM's VM and MVS. Unix is the only operating system that runs on a wide range of hardware.

Not so limited anymore

At least 125 machines from 46 vendors offer Unix compatibility, allowing the operating system to span the broadest range of machine sizes and giving developers hardware independence. For this reason, applications developed in Unix are more readily available.

Developments in networking between operating systems have increased Unix's range even more. It can now serve not only Unix applications but also data base applications written for Personal Computers running IBM's PC-DOS.

Unix has been criticized for its limitations in transaction processing. But multiprocessor machines and developments in data base architecture, such as fault-tolerant SQL software engines, are a few of the advancements that have improved Unix's processing speed and security.

DBMS sponsorship

Other developments have improved Unix's reception. Data base applications have long consumed the bulk of MIS software development resources. In the Unix data base management systems market, data base vendors recognized the importance of standardization early and developed their products on standards such as IBM's SQL.

More recently, the widespread use of fourth-generation languages has made data base technology increasingly available for office productivity. These languages have allowed data base applications to be developed faster, at low cost.

All of this spells good news for Unix. As business finds more uses for data base applications, the demand for highly customized, easy-to-use systems will grow. The only way application developers can meet those demands is by adhering to standards and providing portability — criteria that can easily be met with Unix.

For portability, optimum performance in all but the largest transaction environments and adherence to industry standards, Unix is the operating system of choice and will continue to be even more popular in the future. •

Sippl is president and cofounder of Informix Software, Inc., a relational DBMS manufacturer in Menlo Park, Calif.

Appeal

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code to other vendors. The company also promises to provide source code licenses to colleges and universities.

Open Dialogue should provide Unix vendors with some interesting options. In fact, if vendors accept Apollo's offer and begin to use Open Dialogue to create interfaces, it could go a long way toward demystifying Unix.

It is clear that the market is ripe for a better user interface in Unix. The multiuser, multitasking characteristics of Unix have captured the imagination of users and vendors alike. Attending to the user interface and user needs will be a radical departure for traditional Unix vendors accustomed to concentrating on machine performance and specifications.

However, before Unix truly becomes a viable commercial success, vendors will have to pay more attention to what the user confronts on the screen. Industry developments such as IBM's SAA and IBM and Microsoft Corp.'s Presentation Manager are setting the standard for what users will begin to expect, and Unix vendors will need to meet these requirements. •

Unix hardware for business

COMPANY	PRODUCT NAME	CLASSIFICATION	TYPICAL USE	PRIMARY OPERATING SYSTEM	OTHER OPERATING SYSTEMS SUPPORTED	PROCESSOR ARCHITECTURE	MAXIMUM NUMBER OF USERS SUPPORTED	TYPICAL NUMBER OF USERS SUPPORTED	PROCESSOR STRUCTURE	MEMORY INCLUDED	EXPANSION CEILING	MIPS	PRICE
Altos Computer Systems 800-ALTOS-US	Altos 386 Series 1000	Supermicro	Business office automation	Unix System V/386, V.3	—	80386	16	8-16	Single	2M	16M	2	$7,000-$13,000
	Altos 386 Series 2000	Supermicro	Business office automation	Unix System V/386, V.3	—	80386	64	20-64	Single	4M	16M	2	$25,000
	Altos 3086	Supermicro	Business office automation	Unix System V	Pick	68020	30	3-30	Single	—	—	1.5	Contact vendor
	Altos 2086	Supermicro	Business office automation	Xenix 3.0	—	80286	20	3-20	Single	4M	8M	1.5	$17,995
	Altos 1086	Supermicro	Business office automation	Xenix 3.0	—	80286	10	3-10	Single	2M	8M	1.5	$11,995
	Altos 886	Supermicro	Business office automation	Xenix 3.0	—	80286	8	3-8	Single	2M	3M	1	$7,995
	Altos 686	Supermicro	Business office automation	Xenix 3.0	—	80286	6	3-5	Single	1M	2.5M	1	$3,995
Amdahl Corp. (408) 746-7536	UTS	Mainframe	Large scientific models, all Unix applications	SVID 2.1	—	IBM 370	500, 1,000	200	Single, dual, multi	64M	512M	20-75	From $1 million
Apollo Computer, Inc. (617) 256-6600	Domain Series 6000 Personal Workstation	Workstation	Office automation, data analysis, word processing, CASE[2], financial services	Unix System V, Unix 4.2	Aegis, MS-DOS in window	68020, 68881	1	1	Multi	4M	8M	1.6	$4,990
AT&T (800) 247-1212	AT&T 3B4000	Large mini	Transaction processing, data base management, general-purpose	Unix System V.3.1.1	—	—	300	160	Multi	Variable	240M RAM	3.2-43.4	From $187,000
	AT&T 3B15	Mini	General-purpose	Unix System V.3.1.1	None	32-bit	60	48	Single, with coprocesaor option	2M	16M	1.6, 2.2 with coprocessor	From $49,000
	AT&T 3B/310	Supermicro	General-purpose	Unix System V.2.0.5, V.3.0, V.3.1	None	WE 32100	34 serial connections	6-14	Single	1M	4M	1.1	$8,700
	AT&T 3B2/400	Supermicro	FGP Unix, network server	Unix System V.2.0.5, V.3.0, V.3.1	None	WE 32100	90 serial connections	14-25	Single	1M RAM	4M RAM	1.1	From $12,600
	AT&T 3B2/500	Supermini	Network server, office automation, general-purpose	Unix System V.3.1.1	None	WE 32100	50 direct serial connections	25-40	Single	4M RAM	8M RAM	2.1, 4.0 (optional)	$23,600
	AT&T 3B2/600	Supermini	Network server, office automation, general-purpose	Unix System V.3.1.1	None	WE 32100	90 serial connections	25-64	Single	4M RAM	16M RAM	2.6, 4.0 (optional)	$46,300
BDS, Inc. (703) 481-8700	386 family supermini	Supermini	Office automation	Dynix, Unix System V	MS-DOS	80386	256	8-60	Multi	8M	8M or more	—	From $48,000
	386 family supermicro	Supermicro	Office automation	Unix System V.3	MS-DOS	80386	48	20 or less	Multi	4M-8M	8M	—	From $35,000
	386 family IBM PC AT compatible	Micro	Office automation	Unix System V/386	MS-DOS	80386	16	8 or less	Multi	4M	4M, 8M	7.5	From $10,000
Bell Technologies, Inc. (415) 659-9097	Multipurpose Engine/386	Mini	Office automation	Unix System V/386 Release 3, Xenix 386	MS-DOS	80386	24	6-8	Multi	1M	16M	—	$7,000-$10,000
Computer Consoles, Inc. (714) 458-7282	5/32X	Supermicro	Office automation, accounting, vertical applications, PC server	Unix System V.2	None	68020	32	24	Single	4M	16M	2.4	$20,000-$30,000
	6/325	Mini	(See entry for 5/32X)	Unix System V.2	None	Proprietary (bit-sliced)	64	50	Single	4M	16M	5	$90,000
	6/32 SX	Mini	(See entry for 5/32X)	Unix System V.2	None	Proprietary (bit-sliced)	96	64	Single	4M	16M	8	$110,000
	6/32X	Supermini	Office automation, accounting, vertical applications, PC server, departmental computing	Unix System V.2	None	Proprietary (bit-sliced)	100	64	Single	16M	32M	8	$173,000
	6/32 MP	Supermini	(See entry for 6/32X)	Unix System V.2	None	Proprietary (bit-sliced)	160	128	Dual, asymmetrical	16M	32M	15	$257,000
Concurrent Computer Corp. (800) 631-2154	3200 series	Mini, supermini	Message switching, transaction processing	Unix System V	Proprietary (OS/32)	Proprietary (bit-sliced)	256	100 or more	Single	2M	16M	5	From $225,000
Contel Business Systems, Inc. (313) 323-8170	DS/PC 286-85	Micro	Business, real-time, on-line applications	Microport Unix System V.3	MS-DOS	80286	4	1	Single	640K	8M	—	$4,000-$5,000
Convergent Technologies Inc. (408) 435-3473	S/120	Supermicro	On-line transaction processing, office automation, PC server, vertical markets	Unix System V.3	None	68020	16	12	Single	1M	5M	1.9	Contact vendor
	S/221	Supermicro	(See entry for S/120)	Unix System V.3	None	68020	32	22	Single	1M	5M	1.9	Contact vendor
	S/222	Supermicro	(See entry for S/120)	Unix System V.3	None	68020	32	22	Single	1M	4M	1.9	Contact vendor
	S/320	Supermicro	(See entry for S/120)	Unix System V.3	None	68020	42	32	Single	1M	16M	1.9	Contact vendor
	S/640	Supermicro	(See entry for S/120)	Unix System V.3	None	68020	74	64	Single	None	64M	4M	Contact vendor
	S/1280	Supermicro	On-line transaction processing, office automation, vertical markets	Unix System V.2	None	68020	160	128	Multi (up to 4)	2M (per processor)	24M	8.8	Contact vendor
Counterpoint Computers, Inc. (408) 434-0120	System 19K	Supermicro	Business DP, office automation, PC server	Unix System V.3	None	68020	128	40	Multi	3M	40M	2-12	$15,000
Courier Information Systems (602) 894-7783	Courier Departmental Processor Model 9938	Supermicro	Departmental processing for 3270 cluster users	Xenix 3.4	None	80386	16	8-12	Single	2M	16M	—	$25,800

[1]Million instructions per second [2]Computer-aided software engineering [3]Computer-aided design [4]Very large-scale integration [5]Reduced instruction set computer [6]IBM Systems Network Architecture

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from the vendors.

COMPANY	PRODUCT NAME	CLASSIFICATION	TYPICAL USE	PRIMARY OPERATING SYSTEM	OTHER OPERATING SYSTEMS SUPPORTED	PROCESSOR ARCHITECTURE	MAXIMUM NUMBER OF USERS SUPPORTED	TYPICAL NUMBER OF USERS SUPPORTED	PROCESSOR STRUCTURE	MEMORY INCLUDED	EXPANSION CEILING	MIPS	PRICE
Cromemco (415) 964-7400	CS420EH	Supermicro	Application development	Unix System V.2	Cromix-Plus-C	68020 with 68881	65	2	Single	40M	16M	2-5	$29,995
Cubix Corp. (800) 227-4139	Cubix Squared, Cubix Cubed	Supermicro	Multiuser networking	Unix System V.2, V.3	—	80286, 80287, 80386	8, 16, 32	5, 12	Single	2M	8M	—	$6,000-$25,000
CYB Systems, Inc. (214) 746-5390	U68 series	Supermicro	Departmental computing	Unix System V	None	68010, 68020	8-128	16	Single, multi	2M-15M	15M	—	$13,960-$106,795
Datamedia Corp. (603) 886-1570	DMC/932 Model 2660	Supermicro	Business applications	Unix System V.2	Pick	68020	32	16	Multi	4M	16M	—	$29,000
Digital Equipment Corp. Contact local DEC sales office	VAX 8800 series	Supermini	Accounting, communications, file management, information management, office systems	Ultrix	—	32-bit	—	—	—	—	—	—	Contact vendor
	VAX-11/700 series	Mini	(See entry for VAX 8800 series)	Ultrix	—	32-bit	—	—	—	—	—	—	Contact vendor
	Vaxstation, Microvax series	Workstation	(See entry for VAX 8800 series)	Ultrix	—	32-bit	—	—	—	—	—	—	Contact vendor
Dual Systems Corp. (415) 785-8890	The Series 2 System	Supermicro	Development system	Unix System V	P-COS, OS/9	68020	32-64	32	Multi	4M	2G	—	$20,000-$30,000
Edge Computer Corp. (602) 951-2020	Edge 1000 family	Supermini	—	Unix System V	Unix 4.2	68000	—	—	Single, dual	—	8M-64M	6-11	Contact vendor
Elxsi Corp. (408) 942-0900	System 6400	Minisuper	Large, multiuser data base applications, simulation, CAD³ for electronics, software development	Unix 4.2, Unix System V.2	Proprietary (EMBOS, EMS)	Proprietary (ECL gate array)	1,000 or more	50-300	Multi (up to 12)	16M	2G	12-144 (whetstone MIPS)	$369,000-$3 million
Encore Computer Corp. (617) 450-0500 ext. 2571	Multimax	Minisuper-	Business application development, data base management	Unix System V.3, Unix 4.2	None	Parallel	400	100	Multi	8M	128M	1.5-40	$100,000-$1 million
Harris Computer Systems (800) 4-HARRIS	HCX-5	Supermini	Front-office transaction processing, data base management, office automation, file and computer server	HCX/UX (Unix System V.2 with Unix 4.3 extensions)	—	32-bit bit-sliced	128	50	Single	4M	32M	5	$124,500
	HCX-7	Supermini	Data base management	HCX/UX (Unix System V.2 with Unix 4.3 extensions)	—	32-bit bit-sliced	235	96	Single	2M	128M	7.5	$202,500
	HCX-9	Supermini	Application development, transaction processing, data base management, network hub	HCX/UX (Unix System V.2 with Unix 4.3 extensions)	—	32-bit bit-sliced	256	96	Single	4M	128M	8	$195,500
Hewlett-Packard Co. (408) 447-6481	HP 9000 Model 310	Supermicro	—	HP-UX (Unix System V)	Basic, Pascal	68010	16	1	Single	1M	7.5M	—	$4,845
	HP 9000 Model 330	Supermicro	General-purpose	HP-UX (Unix System V)	Basic, Pascal	68020	32	6-12	Single	4M	8M	—	$10,700
	HP 9000 Model 350	Supermicro	General-purpose	HP-UX (Unix System V)	Basic, Pascal	68020	32	15-25	Single	8M	32M	—	$22,350
	HP 9000 825S	Supermini	General-purpose	HP-UX (Unix System V.2)	None	HP Precision Architecture	64	20-40	Single	8M	56M	3	$42,500
	HP 9000 840S	Supermini	General-purpose	HP-UX (Unix System V.2)	None	HP Precision Architecture	128	40-60	Single	8M	96M	4.5	$81,500
	HP 9000 850S	Supermini	General-purpose	HP-UX (Unix System V.2)	None	HP Precision Architecture	102	60-100	Single	16M	128M	7	$200,000
Honeywell Bull, Inc. (617) 895-6000	XPS-100, Model X-20	Supermicro	Office processing, application development	Unix System V	Pick	68020, VME	32	16	Single	2M	16M	1.7 (2.1 with cache)	$16,580
	XPS-100, Model X-40	Supermicro	Office processing, application development	Unix System V	—	68020, VME	64	32	Dual	4M	32M	3.7	$41,630
IBM 800-IBM-3333	IBM PC XT, AT	Workstations	Office environment	Xenix	—	—	Multiple	Varies	—	—	—	—	Contact vendor
ICL North America (203) 968-7200	DRS 300	Micro	Office automation, communications gateway to host, desktop publishing, accounting, financial applications, graphics	Unix System V.2	C-DOS	80286	8-16	5-6	Single, with multi capacity	4M	4M	—	From $8,000
	DS 3	Supermicro	Office automation, localized accounting packages, word processing, others	Unix System V.2	Pick	68000	16	7-8	Single	2M	8M	1.5	Contact vendor
	DS 4	Supermicro	(See entry for DS 3)	Unix System V.2	Pick	68020	32	10-15	Single	2M	8M	2	Contact vendor
	DS 5	Supermini	(See entry for DS 3)	Unix System V.2	None	Bit-sliced	64	Application-dependent	Single	4M	16M	3	Contact vendor
	DS 6	Supermini	(See entry for DS 3)	Unix System V.2	None	Bit-sliced	64	30-40	Single	4M	Up to 16M	5	Contact vendor
	DS 7	Supermini	(See entry for DS 3)	Unix System V	None	Bit-sliced	128	70-80	—	4M	Up to 32M	8	Contact vendor
Integraph Corp. (205) 772-6220	Clipper-based family	Workstation	Engineering, general business, scientific applications running under Unix	Unix System V.3	None	Clipper	1	1	Multi	6M-80M	80M	5	$10,000-$68,000
Integrated Solutions (408) 943-1902	Optimum V, Optimum 400 series	Workstations, multiuser systems	—	Unix 4.3	Unix System V.3	68020	64	16	Multi	2M	56M	Up to 4	Contact vendor
Kowin Computer Corp. (213) 721-5500	Kowin Two	Micro (time-sharing system)	Small to medium-size business financial applications	Unix System V.3	None	68000	32	16	Multi	2.5M	None	—	$8,500
	Kowin Three	Micro (time-sharing system)	Small to medium-size business financial applications	Unix System V.3	None	68000, 68020	64	32	Multi	4.5M	Up to 8M	—	$11,990
Lee Data Corp. (800) LEE-DATA	Smart Controller	Micro	Spreadsheets, word processing, data bases	Unix System V.2, Microport	—	80286	8-12 (application-dependent)	6	—	1M	7M	—	$10,000-$15,000
Logic Process Corp. (214) 340-5172	MPulse Model 20	Micro	Word processing, data bases, business applications, scientific	Unix System V	None	68020 with dual 68000	32	24	Multi	4M	4M	—	From $5,995

COMPANY	PRODUCT NAME	CLASSIFICATION	TYPICAL USE	PRIMARY OPERATING SYSTEM	OTHER OPERATING SYSTEMS SUPPORTED	PROCESSOR ARCHITECTURE	MAXIMUM NUMBER OF USERS SUPPORTED	TYPICAL NUMBER OF USERS SUPPORTED	PROCESSOR STRUCTURE	MEMORY INCLUDED	EXPANSION CEILING	MIPS	PRICE
Logic Process Corp. (214) 340-5172	MPulse Model 21	Micro	Word processing, data bases, business applications, scientific	Unix System V	None	68020 with dual 68000	32	24	Multi	4M	16M	—	From $8,995
Megadata Corp. (516) 589-6800	8300-7	Micro	Office automation, accounting, data base management	Unix System V	None	68000	10	5	Single	2M	2M	—	$7,130
	8300-6	Micro	(See entry for 8300-7)	Unix System V	None	68010	16	12	Single	2M	4M	—	$9,509
	8300-4	Micro	(See entry for 8300-7)	Unix System V	None	68010	16	16	Single	2M	8M	—	$11,685
	8320-6	Supermicro	Office automation, accounting, software development	Unix System V.2	None	68020	16	16	Single	4M	8M	—	$13,228
	8320-4	Supermicro	Office automation, file server, accounting, data base management, software development	Unix System V.2	None	68020	32	16	Single	4M	8M	—	$15,404
Micro Five Corp. (714) 957-1517	Series 5000	Micro	Multiuser micro	Xenix System V	MS-DOS	80286	16	12	Single	1M	16M	1	$2,450
Microsage Computer Systems, Inc. (702) 322-6868	600 series	Supermicro	Business applications, office automation,data base	Unix System V	NCR-compatible operating system	68020	40	24	Single	4M	32M	2	From $19,995
	400 series	Supermicro	Business applications, office automation, data base	Unix System V	P-System, PC-DOS	68010	22	12	Single	2M, 4M	12M	—	From $9,995
Mitsubishi Electronics of America, Inc. (213) 515-3993	MP-386	Supermicro	Development, multiuser applications	Xenix 286, 386	Unix System V/386	80386	10-16	10-16	Single	1M, 2M	4M	—	Contact vendor
Motorola Computer Systems, Inc. (408) 864-4254	System 8000	Micro	Data capture in state and local governments	Unix System V.3	None	68020	32	20-24	Single	4M	Up to 16M	2.5	From $10,000
National Semiconductor Corp. (503) 629-9090	Integrated Computer Modules	Single-board micro	Embedded Unix applications	Unix System V.3	Unix 4.2, VRTX	NS32000	64	8-16	Single	4M	32M	1-10	$1,995-$5,995
NCR Corp. (513) 445-4169	Tower family	Supermicro	Departmental systems, remote branches	Unix System V.2	RM/COS, Pick	68010, 68020, Multibus I, II	8-128	6, 12, 20, 64	Single, multi	None	2M, 8M, 16M, 64M	—	$5,260-$53,900
NEC Information Systems, Inc. (617) 264-8000	Astra XL/32	Supermicro	Medium-size business or departmental general-purpose	Unix System V	—	68020	32	—	Single	2M	16M	—	Contact vendor
	Astra XL/16	Supermicro	Small business or departmental general-purpose	Unix System V	—	68020	16	—	Single	2M	8M	—	Contact vendor
	Astra XL/8	Supermicro	Small business or departmental general-purpose	Unix System V	—	68020	8	—	Single	2M	4M	—	Contact vendor
Nixdorf Computer Corp. (617) 890-3600	Targon series	Mini	Office automation, data base, data entry, distributed processing	Unix System V, Unix 4.2	None	68020, proprietary bus	16, 32, 96, 256	—	Single, dual, multi	4M	To 96M	2, 6.5	From $30,000
Opus Systems (408) 446-2110	Series 300 Personal Mainframe	Micro or workstation	Multiuser system for government, education, general business	Unix System V.3	MS-DOS	Clipper	24	2-24	Single	4M-16M	4G	5	$6,140-$7,640
Parallel Computers, Inc. (a wholly owned subsidiary of General Automation, Inc.) (408) 429-1338	Parallel 400XR series	Micro	General business applications, emergency dispatching, state lotteries	Unix 4.2 with Unix System V extension	None	68020	120	64-96	Dual fault-tolerant system	2M-4M	8M per processor	2.1	Contact vendor
	Parallel 500XR series	Micro	General business applications, emergency dispatching, state lotteries	Unix 4.2 with Unix System V extension	None	68020	240	64-96	Dual fault-tolerant system	2M-4M	16M per processor	2.1	Contact vendor
Pinnacle Systems, Inc. (214) 340-4941	XLO 20+	Supermicro	Business applications	Unix System V	P-System	68020	32	20	Multi	4M	16M	3	$19,995
	XLO 20	Supermicro	Business applications	Unix System V	Unix System V	68020	32	20	Multi	4M	16M	3	$15,995
	XL	Supermicro	Business applications	Unix System V	Unix System V	68000	24	12	Dual	2M	6M	3	$11,795
Plexus Computers, Inc. (408) 943-9433	Plexus Extended Data Processing System	Workstation, micro	General business applications, payroll, accounts payable, accounting, business application development	Unix System V	MS-DOS	68020	—	—	Single	1M, 8M	48M	3.3-3.5	From $75,000
	Plexus P/90	32-bit departmental system	(See entry for Plexus Extended)	Unix System V	None	68020	64	32	Single	2M	16M	3.3-3.5	From $29,500
	Plexus P/75	32-bit departmental system	Data base-intensive applications, including data base management, transaction processing, departmental/ general office	Unix System V	None	68020	80	45	Single	1M	16M	2	From $36,000
	Plexus P/55	32-bit departmental system	(See entry for Plexus P/75)	Unix System V	None	68020	32	16	Single	2M	8M	2	$25,250
	Plexus P/95	32-bit departmental system	Data base-intensive applications, including data base management, transaction processing, departmental/ general office, office automation	Unix System V	None	68020	128	75	Single	4M	48M	3.3-3.5	From $51,800
Prime Computer, Inc. (800) 343-2540	EXL 316	Supermicro	Commercial distributed DP, departmental computing	Prime's implementation of Unix System V.3	MS-DOS	VLSI[4] Multibus II	58	32	Single	2M	1G	3.2	$23,900
Pyramid Technology Corp. (415) 965-1200	9805	Supermini, mainframe	Data base, on-line transaction processing, office automation	Unix System V.3	Unix 4.2, Pick	Proprietary RISC[5]	512	32	Single	8M	128M	3.5	$106,650

COMPANY	PRODUCT NAME	CLASSIFICATION	TYPICAL USE	PRIMARY OPERATING SYSTEM	OTHER OPERATING SYSTEMS SUPPORTED	PROCESSOR ARCHITECTURE	MAXIMUM NUMBER OF USERS SUPPORTED	TYPICAL NUMBER OF USERS SUPPORTED	PROCESSOR STRUCTURE	MEMORY INCLUDED	EXPANSION CEILING	MIPS	PRICE
Pyramid Technology Corp. (408) 943-9433	9810	Supermini, mainframe.	(See entry for 9805)	Unix System V.3	Unix 4.2, Pick	Proprietary RISC	512	64	Single	16M	128M	7	$209,950
	9820	Supermini, mainframe	(See entry for 9805)	Unix System V.3	Unix 4.2, Pick	Proprietary RISC	512	96	Dual	16M	128M	13	$299,950
	9830	Supermini, mainframe	(See entry for 9805)	Unix System V.3	Unix 4.2, Pick	Proprietary RISC	512	128	Multi	32M	128M	19	$424,000
	9840	Supermini, mainframe	(See entry for 9805)	Unix System V.3	Unix 4.2, Pick	Proprietary RISC	512	256	Multi	32M	128M	25	$514,000
Rexon Business Machines Corp. (213) 641-7110	Summit series	Supermicro	Small business vertical markets (credit unions)	SCO Xenix V	Pick, Business Basic	80286, 80386	128, 16, 32	—	Single, multi	640K, 1M, 2M	—	—	Contact vendor
	Five family	Supermicro	Small business vertical markets (credit unions)	SCO Xenix V	Pick, Business Basic	80286	32	—	Single	512K, 1M	2M	—	Contact vendor
Ridge Computers (408) 986-8500	Ridge 32 Turbo/RX	Supermini	Technical computing	Unix System V	ROS (proprietary)	Proprietary RISC	32	16	Single	4M	16M	2 VAX MIPS	$35,000
	5100	Supermini	Technical computing	Unix System V	ROS (proprietary)	Proprietary RISC	128	64	Single	16M	—	14	$125,000
Sequent Computer Systems, Inc. (800) 854-0428	Symmetry family	Supermini, mainframe	Data base applications	Unix 4.2, Unix System V	None	Parallel 80386	1,024	1,28	Multi	8M-16M	240M	6-81	$89,000-$800,000
	Balance family	Supermini	Data base applications	Unix 4.2, Unix System V	None	Parallel 32032	256	32-64	Multi	2M-8M	28M	1.5-8.4	$49,000-$400,000
Sequoia Systems, Inc. (617) 480-0800	Series 200	Supermini, mainframe	On-line transaction processing	Unix System V.2	—	68020	3000 or more	200-400	Multi	32M	2G	2.5 per processor	From $395,000
Southwest Technical Products Corp. (512) 344-0241	S2000, S2500	Mini	Spreadsheet, office automation, word processing, data bases, general office applications	Unix System V	None	68010	32	15-16	Single	85M	190M	—	$13,995
	S1550	Supermicro	(See entry for S2000)	Unix System V	None	68010	12	8	Single	51M	190M	—	From $5,495
	S1650	Supermicro	(See entry for S2000)	Unix System V	None	68010	12	8	Single	85M	190M	—	From $5,495
Sun Microsystems, Inc. (415) 960-1300	Sun-3/50	Workstation	Finance/CAP	Unix System V, Unix 4.3	Through network; VMS, SNA*, MS-DOS	68020	—	—	Single	4M	—	1.5	$4,995
	Sun-3/60	Workstation	Finance/CAP	Unix System V, Unix 4.3	Through network; VMS, SNA, MS-DOS	68020	—	—	Single	4M	24M	3	$7,995
Symmetric Computer Systems (408) 279-0700	Model 375	Supermicro	Communications element for business applications	Unix 4.2	Unix System V.2, Unix 4.3	National Series 32000	36	12	Single	2M	8M	1.2	$4,995
	Model 875	Supermicro	Communications element for business applications	Unix 4.2	Unix System V.2, Unix 4.3	National Series 32000	36	12	Single	2M	128M	8.5	$9,995
Tandy Corp. (817) 390-3700	Tandy 6000 HD (26-6022)	Micro	Network file server workstation	Xenix System 3	TRS-DOS (proprietary)	68000 16-, 32-bit	6	6	Single	512K	1M	—	$3,499
	Tandy 3000	Micro	Network file server, engineering workstation, stand-alone	Xenix System V	MS-DOS, MS OS/2	80286	6	6	Single	640K	1M, 16M	—	$1,599
	Tandy 4000	Micro	Network file server, engineering workstation, stand-alone, desktop publishing	Xenix System V	MS-DOS 3.2 and above, MS OS/2	80386	6	6	Single	1M	2M, 16M	3	$2,599
Tolerant Systems, Inc. (408) 433-5588	Eternity series	Mini, mainframe (expandable)	Data communications, on-line transaction processing	Transaction Executive (Unix-based)	None	32-bit VLSI	5,000 or more	500	Multi	4M per processor	12M per processor	—	From $275,000
Unisys Corp. (313) 972-7000	5000/30 Models A, B, C	Multiuser micro	Small business, departmental system	Unix System V	None	68000	16	8	Single	2M, 4M	8M	—	$15,000-$25,000
	5000/50 Models B,C	Multiuser micro	Small business, departmental system	Unix System V	None	68000	32	16	Single	2M, 4M	16M	—	$22,000-$60,000
	5000/70 Models A,B	Multiprocessor mini	Small business, departmental system	Unix System V	BTOS	68000	128	64	Multi	2M	48M	—	$28,000-$150,000
	5000/90 Models A,B	Multiprocessor mini	Departmental, distributed system	Unix System V	None	68000	88	32-88	Multi	2M, 4M	16M	—	$85,000-$200,00
	7000-30/40	Super mini	Departmental, distributed, high transaction processing system	Unix System V	None	AMD2901-Shotky 32-bit	64-120	100	Single	4M-16M	32M	—	$150,000-$350,000
Xepix, Inc. (603) 881-8791	3001	Supermicro	Office automation, accounting, financial, engineering workstation	Unix 4.2, Unix System V.2	None	68020	2	2	Single	1M	12M	2.3-5	From $6,675
	6001	Supermicro	Office automation, accounting, financial, engineering workstation	Unix 4.2, Unix System V.2	None	68020	8	8	Single	4M	16M	2.3-5	From $8,445
	120001	Supermicro	Office automation, accounting, financial, engineering workstation	Unix 4.2, Unix System V.2	None	68020	64 or more	16-32	Single	4M	24M	2.3-5	From $13,285
Xtra Business Systems (408) 945-8950	ITT Xtra/286 XL	Micro	Small to medium-size businesses, departmental computing	Xenix System V	Theos and Pick	80286	8	8	Single, dual (optional)	1.6M	4M	1.12	From $9,899
	ITT Xtra/386 XL	Supermicro	Small to medium-size businesses, departmental computing	Xenix System V	Theos and Pick	80386	34	—	Single, dual (optional)	2M	16M	2.03	From $14,799
Zilog, Inc. (408) 370-5990	Zilog System 8000/32 Model 110	Supermicro	Business applications, general accounting, word processing	Unix System V.2.1	None	Western Electric 32100	26	18	Single	2M, 4M	8M	4	$17,450
	Zilog System 8000/32 Model 130	Supermicro	Business applications, general accounting, word processing	Unix System V 2.1	None	Western Electric 32100	58	34	Single	4M	16M	4	$37,950

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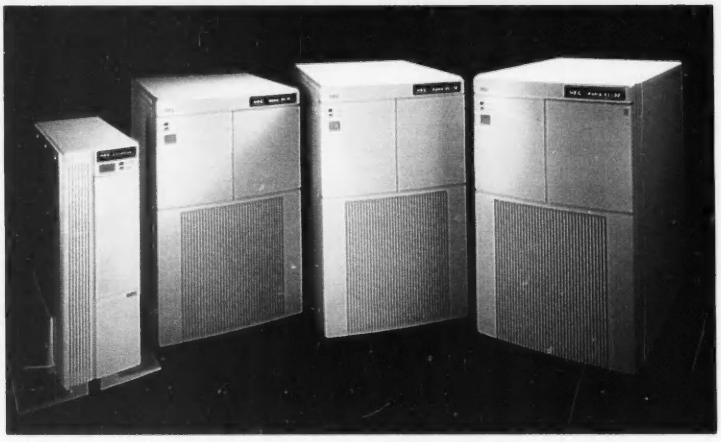

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Rapture, ecstasy and LISP

Give a sanity test to every wild-eyed LISPer you meet

BY MERRILL CORNISH

Whenever a language makes its debut, its users tend to be experimenters. If these experimenters find new power in the language, they often take on a missionary-like zeal for spreading the good word. What you end up hearing is so selective and fragmented that it seems too good to be true.

Although LISP, which stands for list processing, is the second oldest computer language (Fortran is first; Cobol, third), it only recently entered the public spotlight, replete with rumors.

When I first began working on Texas Instruments, Inc.'s Explorer LISP machine project, I was openly incredulous about the wild claims my friends were making about LISP. I had programmed in assembler, Fortran, Pascal and C, plus I had a passing acquaintance with Ada, Cobol and PL/I. This background told me that no matter how well-suited a language might be for one purpose, no single language could deserve the praise heaped on LISP.

As I worked with LISP (and with LISP-ish people), I began to notice that the claims were true. But few actually concerned the LISP *language*. Instead, people were talking about LISP in its LISP machine *environment*. Since these particular people had little contact with LISP outside its unique machine environment, there was no compelling reason for them to separate the two ideas in their everyday conversation.

I have since devised a mean little test to apply to wild-eyed nouveaux "LISPers" to see if they are talking about LISP the language or LISP the environment. Ask them if they would be willing to program LISP in batch mode. If they stare, stammer and sputter at the very idea, you know you're talking to a LISP environmentalist.

Newcomers claim that LISP is great, even though they have yet to make use of its unique features and are coding pretty much as before. In actuality, it is the machine environment they are quickly enamored with — not the language.

As you learn about LISP, it is useful to sort the facts into two categories:

- "Head start" LISP advantages.
- Inherent LISP advantages.

Head start advantages

The LISP environment had a decade's head start in MIT and Stanford University research labs in the early 1970s. Therefore, the bulk of this article describes the LISP environment's features.

Long-standing LISP features could be added to almost any other language, if someone took the time to do so:

- LISP improves programmer productivity through virtual memory and mass storage.
- LISP machines use one language for all their software.
- LISP as a programming environment embodies the meaning of the word "integrated."
- LISP provides both a compiler and an interpreter that can be freely intermixed between individual function calls.

In practice, it is unlikely that any of the traditional languages will challenge LISP in these areas.

Although the techniques are well known, they are highly inefficient on conventional machines. In fact, the language

TED PITTS

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- **LISP language vs. LISP environment**
- **At odds with classic minicomputer ideals**
- **The joys of Meta-Point functions**

itself is inefficient on conventional machines, which is the main reason LISP machines were invented.

Hardware productivity

Whether by design or accident, the MIT LISP machine has had a far-reaching effect on programming productivity. That machine and its software were designed by some of the brightest minds in the computer world — and it shows. Notice how one feature leads to another so that the whole is greater than just a list of the parts:

The MIT LISP machine was designed as a one-person — literally a personal — computer, but one that could use a mainframe on a local-area network as a server. Even though the LISP machine had its own local disk, its software was designed so that it could transparently access the mainframe as a file server.

Suddenly, each of these "personal" computers has hundreds of megabytes of on-line disk storage available from the file servers in its neighborhood.

In addition, the average single-user LISP machine has more local disk space than many popular multiuser departmental computers.

Having this much disk space available offered possibilities that most micro and minicomputer users had never dreamed of. For example, users could now afford to keep all source code (both the system source and their own code) on-line at all times. Furthermore, users could routinely store multiple versions of each file for either historical reference or as a fallback in case of imprudent code changes.

THE LISP WORLD'S approach to programmer productivity is totally at odds with the classic notion that says minicomputer users should conserve memory and disk space and then try to regain productivity through things like structured programming disciplines.

Relying on memory

LISP characteristically tromps through a lot of memory even though it may use only a nominal amount at any one time. Therefore, a virtual memory system is a must for any serious LISP machine design. This inherent dependence on virtual memory became a long-term enabling factor for the LISP machine's success (see story page 82).

Because of all the virtual memory available, LISP machine users began saving more and more information about their code in memory:

- A documentation string, typically one to four lines, for functions and variables.
- Debugging information such as the names of the arguments of each function.
- The name of the source file containing the definition for every symbol name in the LISP system.

Now we can see some of the synergy resulting from having a lot of disk space and a lot of virtual memory on the same machine. Saving 10,000 or more function definitions in 100 or more on-line files becomes a lot more useful if you can also keep a cross-reference on which files contain which definitions. All of this leads to a feature that makes programmers' eyes light up — Meta-Point.

From the Explorer's Zmacs editor, the Meta-Point single-keystroke command allows the programmer to point with the mouse to a LISP function or variable name. With the click of a mouse, the user selects the definition of that name for editing. Zmacs looks up that name's source file (which is being remembered in virtual memory), loads that file into the editor and then searches the file until the definition appears at the top of the screen.

Meta-Point allows LISP programmers to go directly to the source code to see how something really works rather than look it up in the documentation. It is so easy to chase down the function definitions, why read documentation written by other programmers?

Other built-in cross-reference features allow you to point with the mouse and perform the following functions:

- Press Control-Shift-D to see the documentation string of the first function name in front of the cursor.
- Press Control-Shift-A to see the argument names of that function.
- Press Control-Shift-V to see the documentation of the first variable name in front of the cursor.

The exact keystroke command is not important. The point is that a large amount of program information is available in a second or two with little more effort than typing an uppercase letter.

Notice that there is no magic here. There is nothing LISP-ish being done. The Explorer's Zmacs editor does not do anything that any editor for any language on any machine could not do if it had the disk and the memory. The LISP world's approach to programmer productivity is totally at odds with the classic notion that says minicomputer users should conserve memory and disk space and then try to regain productivity through things like structured programming disciplines.

Software productivity

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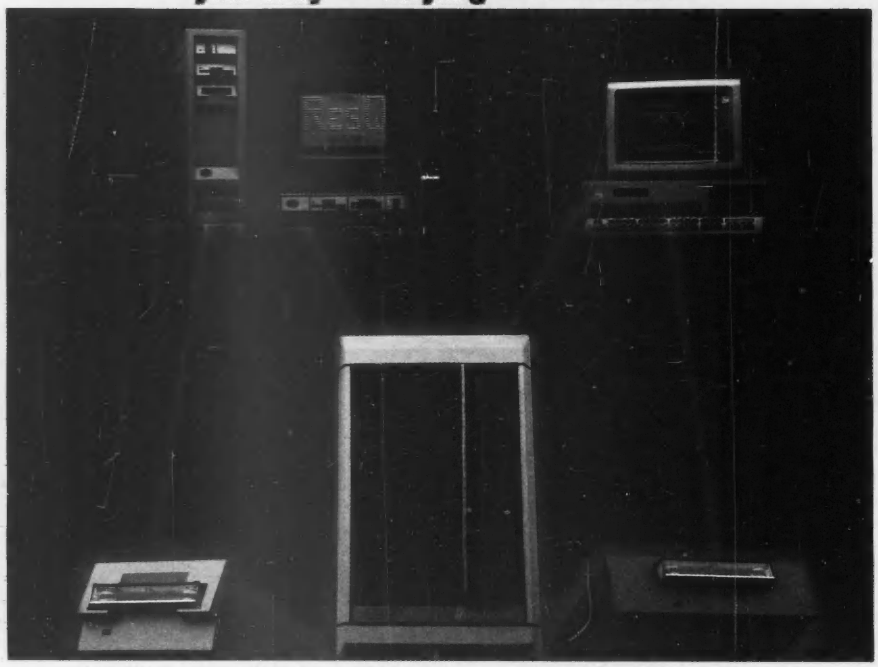

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implementation languages. Even within the "same" language, you may find that one product needs this compiler while another needs that link editor and so on. You will never fully appreciate how such fragmentation limits productivity until you have used a single-language system.

For example, LISP machine users quickly get used to the idea that everything is in LISP; if a feature works in one place, it is probably available every place. In LISP, integration of functionality is the normal way of doing things, whereas in the rest of the computing community, integrated software represents a new idea.

IN LISP, integration of functionality is the normal way of doing things, whereas in the rest of the computing community, integrated software represents a new idea.

I am amused, and sometimes a little disheartened, to find that some people do not understand integration even when they see it. Occasionally, while showing off my Explorer, I hear people complain that they would have to learn LISP to use the Listener, the Explorer's command interpreter shell.

The integration argument

A better point is, "If you know how to program a machine, then why should you have to learn a different language to run programs on that machine?" If you know how to program your Unix workstation in C, why should you have to learn the Bourne shell language to run your C? If you know how to program your PC in Turbo Pascal, why should you have to learn MS-DOS to run your Pascal? Integration means more than just being able to move data among applications.

The partisans of each language claim their language is the most productive. Ignore them. Compiler implementation choices can affect productivity much more than pure language details, such as which statements have semicolons after them (a hot topic in certain circles).

Take the notion of "binding time," the point in the programming process after which information is frozen and not allowed to change. At one extreme, Fortran freezes almost everything at compile time, allowing extensive compiler optimization because the compiler knows exactly what is going to happen. However, it does not allow much flexibility, since you can do little about information discovered during execution.

In the case of LISP, all aspects of the language can be bound at runtime for fully interpreted code that is flexible, but it is slow, since everything is put off until the last moment. It can also be bound at compile time for fully compiled code that is fast but inflexible; or, it can be combined, letting you meld these two extremes.

In PC magazines, you will sometimes read discussions about which is better — compiled or interpreted Basic. Why should you have to make an all-or-nothing choice? With LISP, you can freely mix compiled and interpreted code as your programming requirements demand.

LISP, reputedly an interpreted language, is, therefore, thought to be slower than compiled languages. Actually, interpretation as the primary form of execution is an anachronism out of LISP's primitive beginnings.

In modern times, interpretation on LISP machines is relegated to certain parts of the user interface, in which typing and reading speeds are the limiting factors anyway. In practice, virtually all LISP machine work is compiled. Incremental compiles are fast and memory efficient, and the compiler gives far better diagnostics than the interpreter.

Once again, there is no magic in how LISP does what it does. The LISP implementation simply draws no artificial distinctions between interpreted and compiled execution. It uses a lookup table for all function names. If your program calls a function "Foo," LISP looks up

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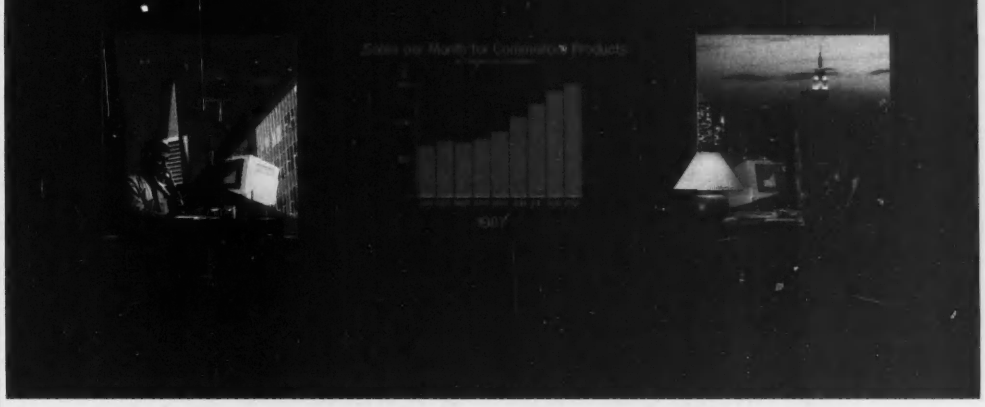

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the Foo entry in the table and executes whatever it finds there, be it a LISP form to be interpreted or a block of machine code to be directly executed.

The added overhead of this intermediate lookup step would be unthinkable in most languages, but LISP machines are optimized for this sort of thing. Now, consider one of the things LISP can afford to do, given that it has this lookup step.

If you change one function during a debugging session, you do not have to recompile the entire file and then relink the entire program. Instead, you recompile just that one function (incremental compile) and insert the new definition in the lookup table (dynamic link-edit). The remainder of the program does not know that anything has changed, but the next test run will use the new version of the function.

If all this talk about changing lookup table entries sounds messy, not to worry. The system does all the dirty work for you. For example, to change a function, you might do the following:

- Point with the mouse to the name of the function you want to change and use Meta-Point to make the editor find that function's definition for you.
- Edit the change into the editor's buffer.
- Press a single key to recompile and relink the function you just edited.

When you finish, the LISP program now ready to execute is exactly the same as if this new version of the function had always been there. All the lookup table manipulation mentioned above was hidden behind a single Compile keystroke command.

There is another side to programming productivity: unprogramming productivity. In addition to compiling the new version of the function, the Compile keystroke command saves the old definition before installing the new one. If you later tell the system to "undefine" the new function, it will reinstall the previous definition. Saving previous definitions to aid programming debugging is another example of how a large virtual memory can be used to increase productivity.

Inherent advantages

The advantages inherent in LISP might be imitated by new features to nonsymbolic languages, but usually they are a poor reflection of the original. These advantages are the same form for all language constructs — a function call, and direct support of symbols as a data type and support of lists as a data structure to hold those symbols.

Try, for example, to do string processing in good old Fortran 66, which deep down understands only integers, reals and arrays. Now let's say you moved to C, which has characters and strings as data types. Even though you may be running both languages on the same computer, the world of string processing seems so much simpler in C than in Fortran, because C has the relevant data types and data structures.

Virtually all the popular languages were designed to crunch numbers — and only numbers. While the computer industry has raised number crunching to a high art, we now suspect that most of the problems waiting to be solved are symbolic — they do not involve numbers or things as readily representable as numbers. You can imitate many features of LISP's symbols and lists in other languages, but you would spend all your time fighting housekeeping details rather than solving your problem.

Uniform syntax

LISP has a uniform syntax: Everything looks like a function call. This "feature" can be annoying because it sometimes leads to programs that seem to be as much parentheses as code.

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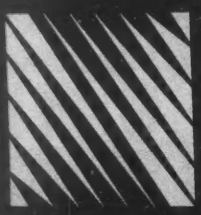

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extend the language. Most languages can be extended by writing functions to create more operators. Critical features in these languages, such as data declaration and control flow constructs, can't be extended because they don't look like functions. For example, C supports record structures with its built-in "Struct" declaration. If you do not like C's Struct, there is little you can do about it. Anything else you create with your own C functions will not blend with the rest of the language the way the built-in Struct does.

LISP, on the other hand, has no built-in support for records. It does, however, have a "Defstruct" macro, which does just about everything C's Struct does and then some. In contrast to the problems of enhancing Struct in C, LISP's Defstruct fits in smoothly, as though it had been designed into the base language.

As in most trade-offs, the feature that offers capability carries a liability. The traditional link-edit step figuratively casts the conventional program in concrete. Key locations in each compiled module are directly modified so that the whole thing looks as if it were more or less written as one huge program.

For the program developer, debugging amounts to chipping out pieces and then recasting them into place. To someone faced with a large amount of debugging, LISP's incremental compile and dynamic linkage are life savers. All the user need do is recompile one function and rerun the test.

LISP's wondrous flexibility is also a problem. If a programmer modifies a function used throughout the system, not only is the program under test modified, but the whole system also changes — sometimes for the worse.

Supposed triumphs

Most of what you hear on the street about LISP is true, but it is the result of the LISP environment rather than the language itself. In all fairness, I will admit that LISP was designed for a significantly different application area than had ever been tackled.

Therefore, a lot of the supposed triumphs of the LISP language over conventional languages are really tacit admissions that we had previously attempted naturally symbolic applications with inherently numeric tools.

Now that we have some symbolic tools, things seem so much better. Of the symbolic languages and environments now available, the common LISP environment on a LISP machine is one of the most productive. •

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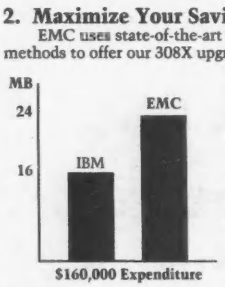

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• Information in virtual memory is already part of the program: You can directly branch to the code, and you can directly fetch the data. Access to information in a file is subject to the bureaucratic delays of the operating system, such as directory lookups, ownership verification and access-rights checks.

For example, both the LISP machine and the Unix operating system support virtual memory and file systems. If you give both operating systems a mass of information to remember, you will probably find that the LISP machine puts most of the information in its virtual memory while Unix puts most of it in its file system. At runtime, the LISP machine will have more information available for immediate use in its environment to work with than will the Unix machine.

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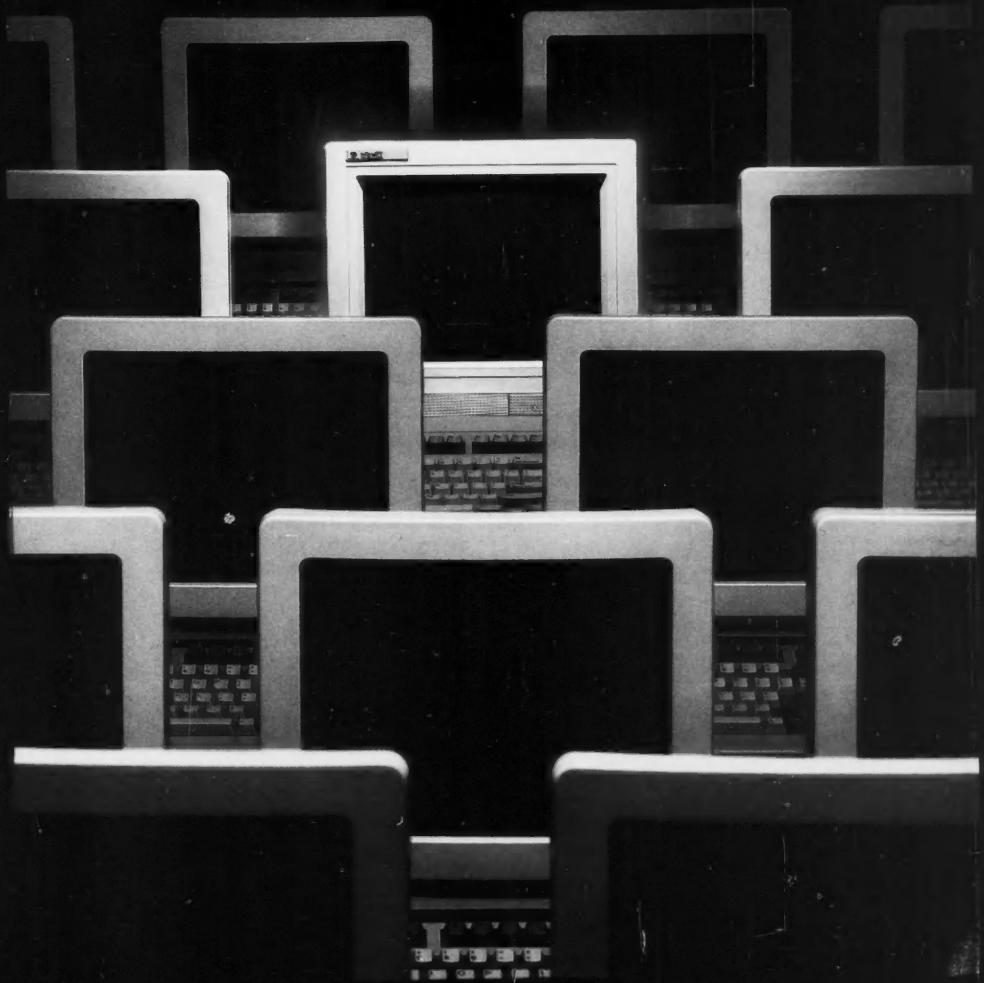

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Elegant design gets lost in the translation

Matrix method can turn a solid design into robust, maintainable software

BY GOPAL KAPUR

The revolution of structured analysis marched on the DP industry with promises of improved reliability, greater productivity, satisfied end users and reduced maintenance. Careful analysis of the approaches put forth by early proponents shows that one-third had substance, one-third was wishful thinking and one-third was pure hoopla.

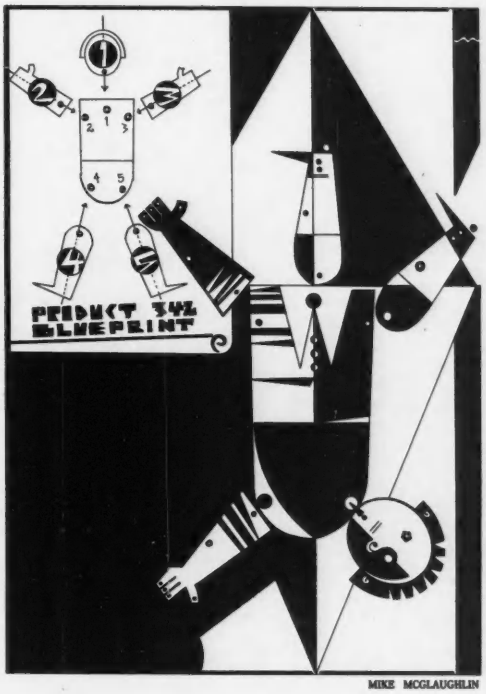
Poorly tested and half-baked ideas were marketed to an industry that had grown to enormous proportions without having developed either a strong engineering or strong scientific foundation.

Most application analysts and programmers were — and still are — taught by rote rather than by derivative logic methods. Locked into textbooks, life cycle methodologies and simplistic, mainframe-oriented accounting systems, structured analysis slowly began to lose favor in the industry.

But certain benefits have risen from structured system analysis. It taught analysts to partition complex structures. It introduced hierarchy and independence, and it encouraged simplification through stepwise refinement. Structured analysis enabled analysts and users to diagram systems in a nonphysical manner, concentrating on what needed to be done rather than how to do it.

However, major problems arise when one has to translate system-level data flow diagrams into a well-structured system — the crucial and often elusive step in system design. The nemesis of structured methodology is the transition from structured analysis to structured design.

Kapur is president of Kapur & Associates, Inc., an information systems consultancy in San Ramon, Calif.



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Five years ago, Kapur & Associates, Inc. began to experiment with a method to ease this transition by isolating components from the analysis during the design phase and then reintegrating them at the time of program execution. This approach has evolved into what we call Matrix-Driven Structured Design (MDSD).

The method is based on the premise that any automated system consists of the following key components: A set of functions must be executed to accomplish desired results. A set of data streams triggers a series of functions to be executed. And a set of logic drivers specifies the sequence for functions to be executed for each data stream. Isolating these components during design reduces system complexity and allows for progressive design, testing and implementation.

This method, outlined below, can help solve many of the difficulties associated with developing and maintaining large, complex applications today.

Catch the difference

The process of moving from structured analysis to structured design is abstruse, fraught with problems and often labeled "intuitive." This is primarily because of short-sightedness and a lack of knowledge on the part of those proponents of structured methods who, early on, failed to see the difference between analysis and design. An in-depth review of DP literature shows that many industry spokesmen did not clearly differentiate — and still have not — between analysis, which determines and conceives an appropriate architecture, and design, which engineers and builds a system according to that architecture.

There is a well-confirmed story in which one of the gurus of structured methodology used a number of interlinked paper clips and key rings to depict the structure of a new system. He mysteriously pointed to a specific ring as the central transform and yanked it up in the air. He declared that the resulting dangling form would be the system architecture, with oohs and aahs emanating from where the seminar participants sat. It's no wonder that systems analysts are still having problems making a smooth transition from structured analysis to structured design.

Another fundamental flaw in the conventional structured design process relates to the operational nature of the resulting system. For example, in the case of an automobile, it is not necessary for every part to be operational at all times. If the horn is out of order, one can still drive the car (though perhaps not in

- **A method, not a methodology**
- **Structured design: One-third wishful thinking**
- **Decompose, define, validate**

certain parts of New York City). Another example is that of a housing development: Every house does not have to be finished before people can begin to move in. Can information systems be designed and engineered in the same manner?

IN A HOUSING development, every house does not have to be finished before people can begin to move in. Can information systems be designed and engineered in the same manner?

One bad apple . . .

If a bank has an automated system to process 15 different types of loans, the entire loan system should not come to a halt if one part of the system malfunctions. Also, the loan processing system should be designed so that it can be implemented in phases, rather than the bank having to wait until the entire system is built, tested and implemented.

Another example is that of a payroll system that deals with many categories of employees. If a typical system were to fail, it would do so across the board, even though the processing problem impacted only one category of employees. The system should be designed so that the data for employees within the affected category can be trapped, while allowing all other data to be processed without delay.

Envision for a moment an automobile factory. Assume the factory builds a certain type of car, which consists of a number of subassemblies, which consist of a number of individual parts. Engineers typically use a bill-of-materials processor system to define the relationships of individual parts to subassemblies, which are further related to categories of cars.

If a specific part has to be redesigned, retooled or repriced, the bill-of-materials system can show the impact of such changes not only on the specific part but on all affected subassemblies and cars.

Unfortunately, this is not how DP systems are designed and organized. It is important that we break away from the conventional design approach to one that parallels the engineering methods outlined above. As early as 1976, an IBM manual on program design stated, "The design of a complex program can be made simpler by dividing it into separate parts in such a way that each part can be considered, implemented, tested and corrected with minimal consideration of, or effect on, the other pieces."

Divide and simplify

At Kapur & Associates, we have achieved this by dividing a system into three primary components:

- A set of functions, including application-related data transformation functions.
- A set of data streams (data records).
- A set of logic drivers — a specific sequence in which specific functions are executed to transform a given data stream.

In conventional design, the logic drivers are buried within the program and cannot be viewed separately from data transformation modules. One must read through a program to find which specific modules are invoked to process the data stream. The problem is compounded when a given function is used by more than one data stream, thereby making it a part of more than one logic driver. As is often the case, a given function may be used in different sequences by different logic drivers. This intertwining of logic drivers and functions makes the program more complex and difficult to change.

For example, what do you do when a function that is part of more than one logic driver needs to be changed, but the change does not apply to all of the logic drivers? Or what if a given function's sequence of execution changes for a particular, or entire, data stream and needs to be removed?

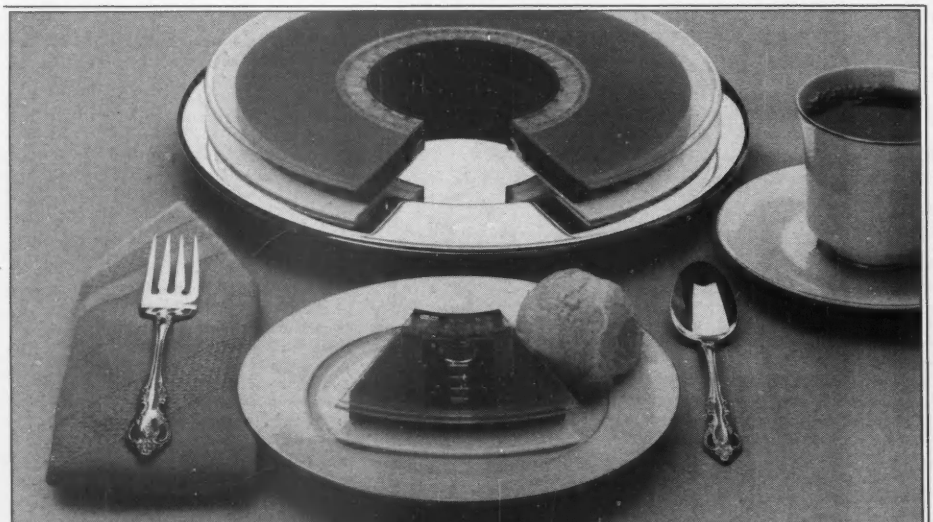
Kapur & Associates' MDSD approach isolates these three components (functions, data streams and logic drivers) during the design phase and reintegrates them at the time of program execution. The steps in MDSD are as follows:

First, decompose system requirements into a set of discrete functions. This can be accomplished through the use of work-breakdown structures, hierarchical function decomposition, stepwise refinement, Warnier-Orr diagrams or any similar approach that is suitable for hierarchical partitioning.

Second, define the various data streams that drive the system. Note that Steps 1 and 2 are not necessarily sequential.

Third, build a Function-Data Matrix (see chart next page).

- Enter data stream names across the top to label the columns of the matrix. Rank



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the various data streams in the order in which they need to be implemented, since in any given system, not all data streams need to go into production at the same time. Establishing priorities here will help the designers and programmers specify, code, test and implement the system in the order of its required implementation.

- Enter function identifications, names and aliases down the left side to label the rows of the matrix.
- Go down each column and check off the functions needed to process that data stream by entering an "X" in the "Needed for processing" box. Do not be concerned at this point about the sequence in which these functions need to be executed.
- Now enter the sequence in which various functions for a given data stream must be executed. During this step, you also need to indicate whether a function is executed conditionally. This is done by entering the symbol "?" to indicate "if" or the symbol "@" to indicate "until" or "while" in the "Condition" column.

We have found MDSD most viable when an automated table is used to build and maintain the Function-Data Matrix.

The fourth step is to code the logic driver for each data stream.

The logic drivers can be executed in two modes: stub or execution mode. When a module is executed in stub mode, the module's object code is not executed; instead, a stub mode message is printed. In execution mode, the object code for the module is actually executed.

The fifth step is to specify each of the functions in more detail. This is best accomplished by using a Structured Module Specification diagram with the following fields:

- Function identification.
- Function name.
- Function alias or aliases. Experience shows that functions that are common to multiple systems may be referred to by different names by different groups. Therefore, it is important to record commonly used aliases for a given function. This precaution will facilitate future search for the function and enhance reusability.
- Function description should be detailed enough that both an end user and programmer can easily comprehend the purpose and procedure of all application-related modules.
- Module strength.
- Stub mode message.
- Input data elements.
- Output data elements. Specifying input and output data elements limits each module to the specific data needed to execute its function, which is a highly desirable attribute of data-coupled modules.
- Local data elements; that is, a list of the data items used by this module for temporarily storing data during its execution.
- Code; namely, the code for procedural transformation of input data to output data. In the early stages of system design, this consists of Structured English, or "pseudocode," and can be augmented by diagrams.

Once stub mode testing is completed, the programmer codes the logic in the designated computer language. It is important to note that different functions can be coded in different languages.

- Date installed.
- Date last changed.
- Times used. This value is used to isolate the most frequently used functions. Such functions are analyzed for data stability

Function-data matrix

This matrix maps the required functions of a system under development against the data streams that will drive that system

Data stream names	*Data stream A*			*Data stream B*			*Data stream C*			*Data stream N*		
Functions and aliases	Needed for processing	Sequence of execution	Executed conditionally	Needed for processing	Sequence of execution	Executed conditionally	Needed for processing	Sequence of execution	Executed conditionally	Needed for processing	Sequence of execution	Executed conditionally
Function ID Function name (aliases)	X	3	?							X	3	?
Function ID Function name (aliases)				X	2		X	1		X	1	
Function ID Function name (aliases)	X	1					X	3				
• • •												
Function ID Function name (aliases)	X	2	@	X	3		X	2		X	2	

? = IF
@ = UNTIL or WHILE

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and execution efficiency.
- Error count.
- Change count.
- Development effort, measured in hours.
- Maintenance effort.
- Author's name.
- Walk-through team members.
- Failure history.
- Maintenance history.

Documentation for different modules can be kept in a separate library to reduce the size of object code.

If it fails . . .

Testing has always been the Achilles' heel of the data processing industry. We are all familiar with the old adage, "If it ran, it was production; if it failed, it was a test."

A TYPICAL test procedure covers so much ground and produces so much data that the thought of analyzing the results can be overwhelming.

The DP industry spends almost half its budget on testing software and still has difficulty producing reliable systems. One reason for poor-quality testing is that conventional systems (yes, Virginia, even structured systems) are inherently complex in their organization. A typical test procedure covers so much ground and produces so much data that the thought of analyzing the results can be overwhelming.

With MDSD, the task of testing is simplified by partitioning the testing procedures into four progressive steps: First, validate individual logic drivers. Next, test the logic driver in stub mode. Then, perform a unit test of each function. Finally, test the logic driver in execution mode.

Progressive testing

The first test, validation of individual logic drivers, can be carried out as soon as the Function-Data Matrix for a given data stream is completed. In fact, any doubts about the validity of the logic drivers must be resolved before continuing the design process. Both end users and MIS team members should review the logic drivers and validate the order and conditions governing the execution of functions for each data stream.

Stub mode logic-driver testing can begin once all the functions for a given data stream have been identified, its logic driver defined and certain component functions identified in the Structured Module Specification — namely function identification, function name and stub mode message.

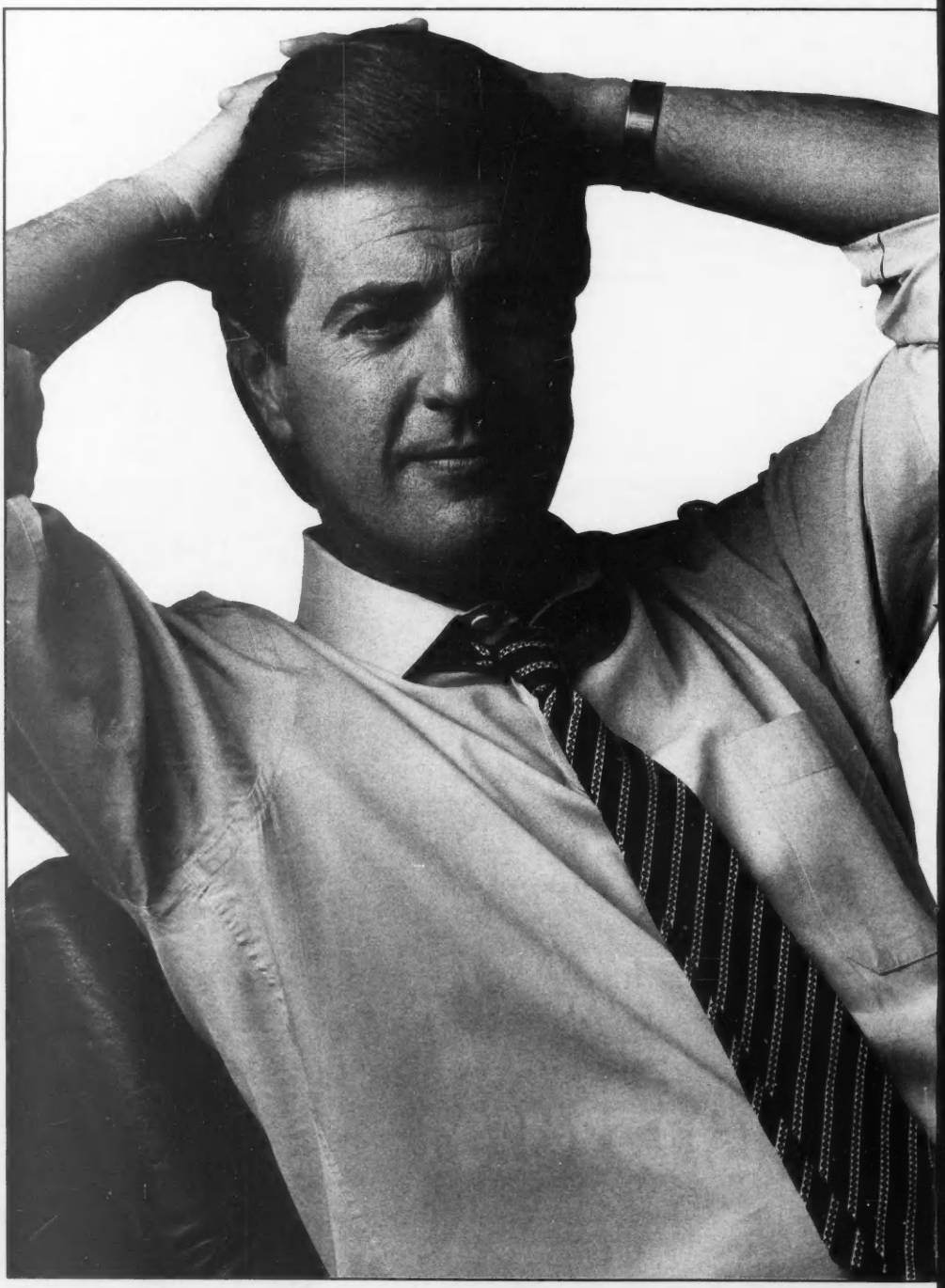
When the logic driver for a given data stream is executed in stub mode, the system simply prints the identification, the name and the stub mode message of each of the functions invoked by the logic driver. The listing produced by this execution cycle should be reviewed by MIS and end-user team members to validate the data stream processing logic.

Once the data stream processing logic has been validated, programmers can begin to code the detailed procedural logic for each module. Each of these coded modules is unit-tested using the following steps:
- Input only correct data.
- Input all incorrect data.
- Input correct and incorrect data.

In carrying out these steps, the basic principles of software engineering must be strictly followed. Each module must be evaluated for strength, coupling, cyclomatic complexity, function stability analysis, code quality, documentation quality and robustness. Comprehensive black- and white-box testing must be undertaken to ensure functional and procedural reliability, respectively.

Once all the functions for a given data stream have been unit-tested, the logic drivers can be tested in execution mode; that is, the object code of each of the invoked modules is executed. The output should be reviewed by MIS and end-user team members to validate the execution-mode processing logic.

This progressive testing allows us to isolate any problems



and correct them at the earliest phase. Partitioning system requirements into component functions reduces the overall complexity and localizes any defects.

A consuming task

Another major pitfall of conventionally designed software is maintenance. Poorly designed systems consume a disproportionate amount of DP resources. The key problem is that when poorly designed software is changed, the side effects are unpredictable. Any attempt to correct one defect has a great chance of introducing many new defects — as well as starting a vicious cycle.

With conventional system design, it is almost impossible to avoid these problems. However, MDSD has the inherent quality of exposing any such problems at the source. The physical separation of logic drivers from functions, and further separation of an individual function from other functions, makes it easy to investigate the cause-and-effect phenomenon of any change. Discussed below are methods for handling software maintenance within MDSD.

Changing a function. If a given function needs to be changed, the first step is to check the Function-Data Matrix to see if the function is used by any other data stream. If it is not, change the appropriate attributes of the effected function, unit-test the changed function and test the data stream in execution mode.

If the function is used by other data streams, the maintenance steps are as follows: Null the current function from the logic driver of the effected data stream by setting all columns to blanks. Add a new function to the Function-Data Matrix. Enter the execution sequence and execution condition, if any, in the logic driver of the data stream. Then code, test and catalog the new function into the code library. Finally, test the logic driver.

Removing a function. Compared with the conventional software design approach, this process is very easy with MDSD. Simply null the function from the logic driver of the effected data stream. This is done by setting all columns to blanks. The "Sequence" column entries for the remaining functions of the data stream may need to be reordered.

> POORLY designed systems consume DP resources. And when poorly designed software is changed, the side effects are unpredictable.

Adding a function. First, add a new function to the Function-Data Matrix. Then enter the execution sequence and execution conditions, if any, in the logic driver of the data stream. Next, code, test and catalog the new function in the code library. Finally, test the logic driver, first in stub mode and then in execution mode.

Resequencing a function. Simply reenter the sequence in which various functions are to be executed for the given data stream. Execute the logic driver in stub mode and then in execution mode.

System expansion. As the scope of a system changes during design or development or after implementation, the programmer can make changes that result from new or modified data streams, functions and logic drivers with greater confidence and in considerably less time than conventional design methodologies allow.

An ounce of prevention

Nonfailure or preventive maintenance is a common and accepted engineering method of upgrading and enhancing existing systems. A machine may be in good working order, but the maintenance engineer could decide to replace an existing, much-patched part with an improved, low-maintenance one to enhance the performance and life expectancy of the machine.

Nonfailure maintenance is strongly recommended for systems developed using MDSD. Selected modules that have gone

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through considerable maintenance can be analyzed for performance, reliability and quality and replaced with improved versions, if necessary.

Much has been written about the need for and benefits of a phased development process.

Although it is an excellent idea, designers have had considerable difficulty putting the phased development process into practice because conventional life cycles and design approaches are linear in nature and do not lend themselves well to cyclic expansion.

Everything's cyclical

MDSD lets designers build by cyclic expansion of various system attributes rather than by linear additions, so that phased design, development, testing and implementation processes are easy to achieve.

For example, designers do not need to completely partition the requirements definition into the Function-Data Matrix before starting to build logic drivers for individual data streams. Similarly, individual Structured Module Specifications can be developed in three progressive phases: stub mode, mini-specifications and source code.

Logic-driver testing can begin early in the design process for high-priority data streams. This testing is usually accomplished in two steps: stub and execution mode.

This cyclic expansion of the Function-Data Matrix and Structured Module Specifications, combined with progressive testing, is a viable phased approach to system design, development testing and implementation.

Throughout the design and development of a system, critical thought should be given to identifying functions or modules that could be used in other systems. Such modules are good candidates for recording in a common code library. It is a well-established fact that the use of common code improves productivity and reduces maintenance.

MDSD also lends itself well to the prototyping of data streams,

WITH MDSD, a partially working system can be given to users for their review and comment.

user needs (input and output definition and verification), alternate ways to design and code specific functions or any other aspect of a system that warrants experimentation. With MDSD, a partially working system can be given to users for their review and comment.

Toward better systems

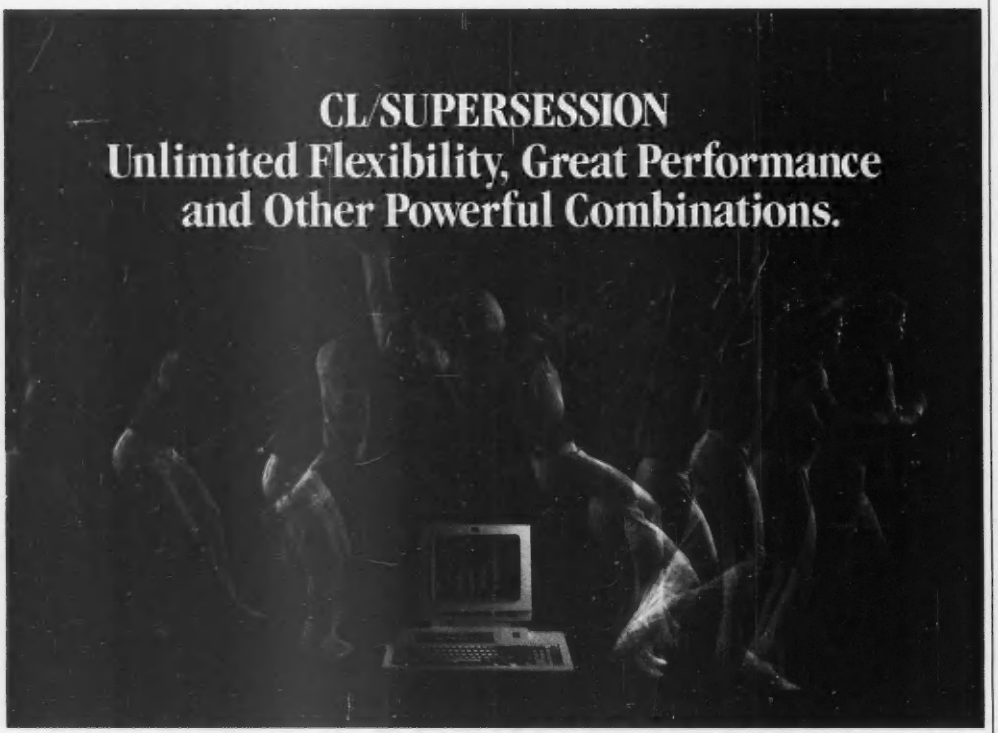
MDSD's approach to system design and programming isolates and separates the data streams, functions and logic drivers, thereby reducing the complexity of a system. It also allows for progressive design, programming, testing and implementation of a system. System maintenance is simplified and made much more manageable.

The benefits of MDSD are many and varied. Systems are less complex because partitioning the system into components simplifies system design. Systems are more reliable because they are less complex and because of module independence, progressive testing and reuse of common code.

Systems require less maintenance, again because of their reduced complexity, module independence and reusable design and code. In addition, the maintenance is much easier because the effect of changes is more visible and predictable.

Developers will notice higher productivity and reduced cost for many of the same reasons at all levels of system design, coding, testing and implementation. Developers can also monitor progress more accurately because each design component is a milestone.

These benefits, combined with appropriately placed walkthroughs, quality assurance and adherence to sound software engineering principles, result in high-quality software. This, in turn, leads to increased user satisfaction and gives credibility to the MIS organization. •



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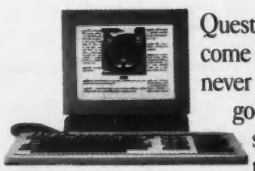

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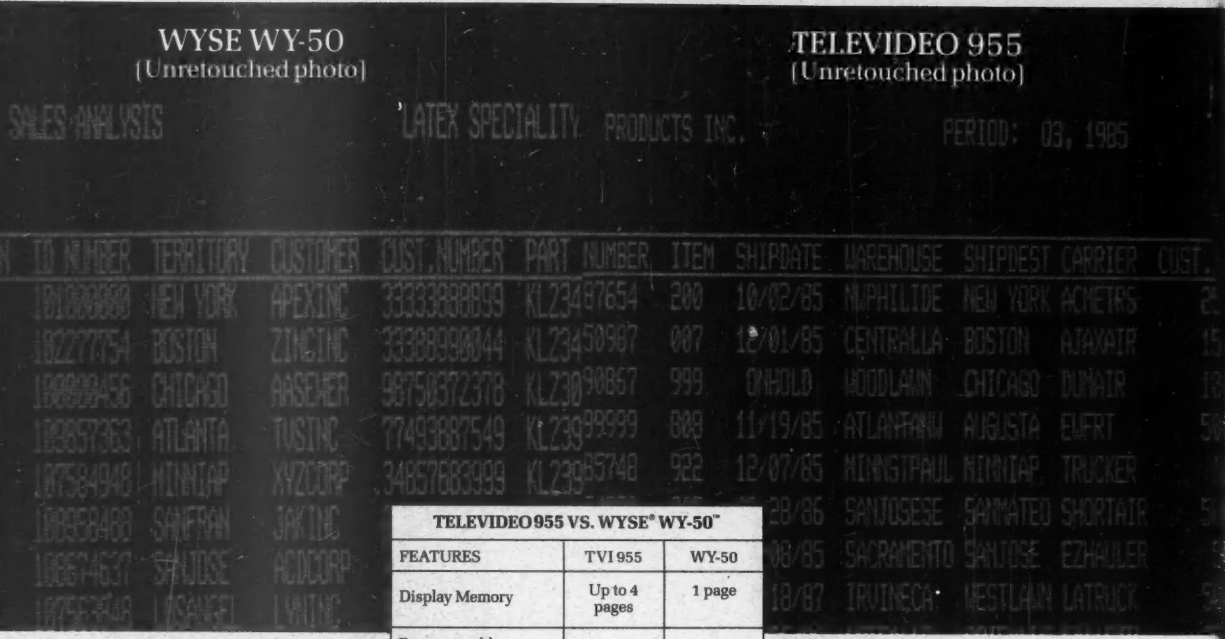

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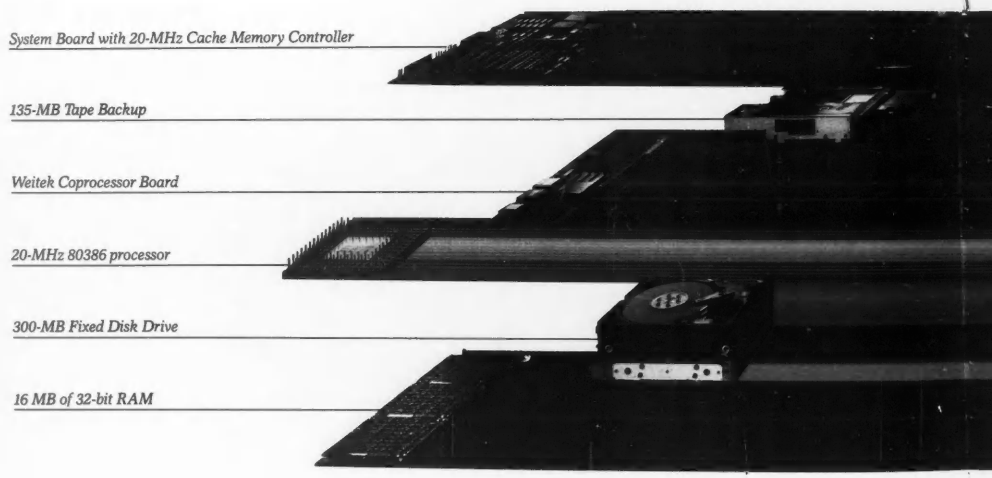

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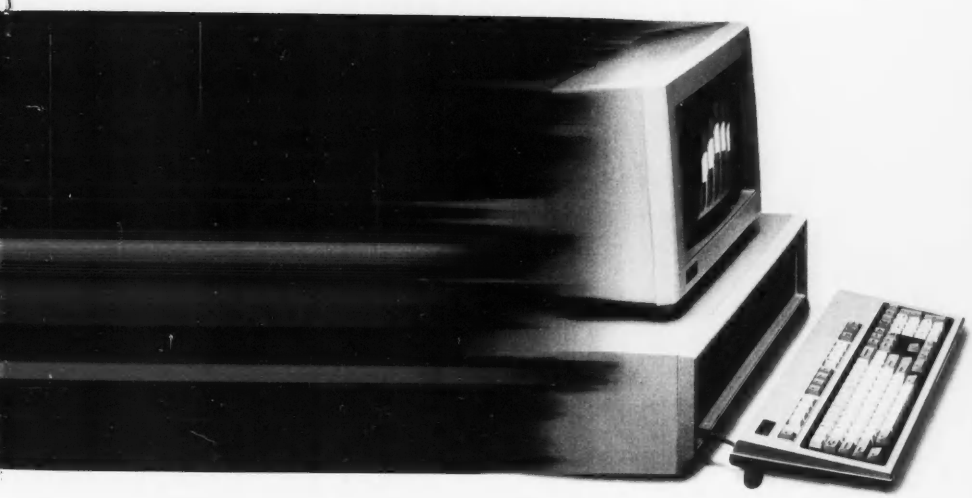

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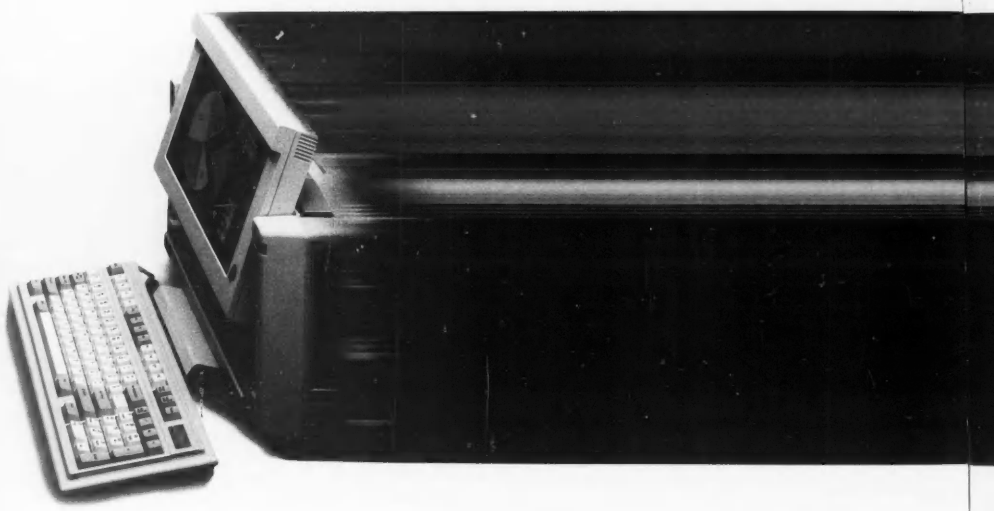

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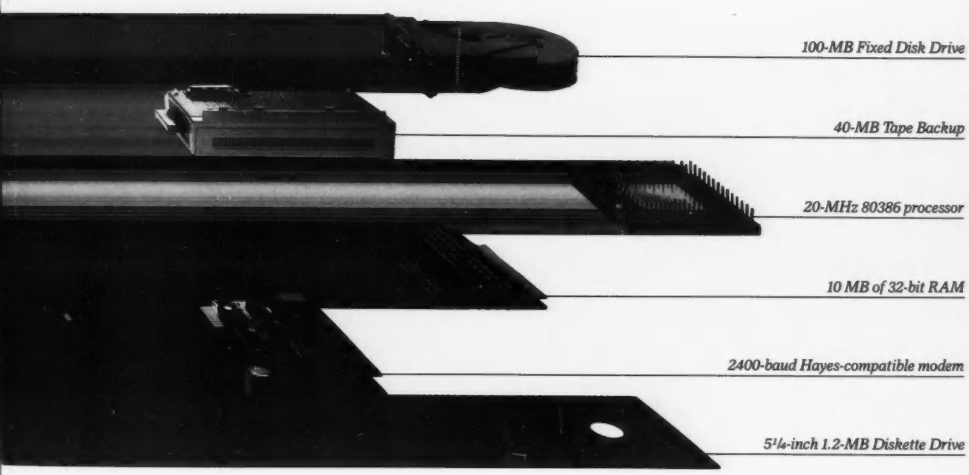

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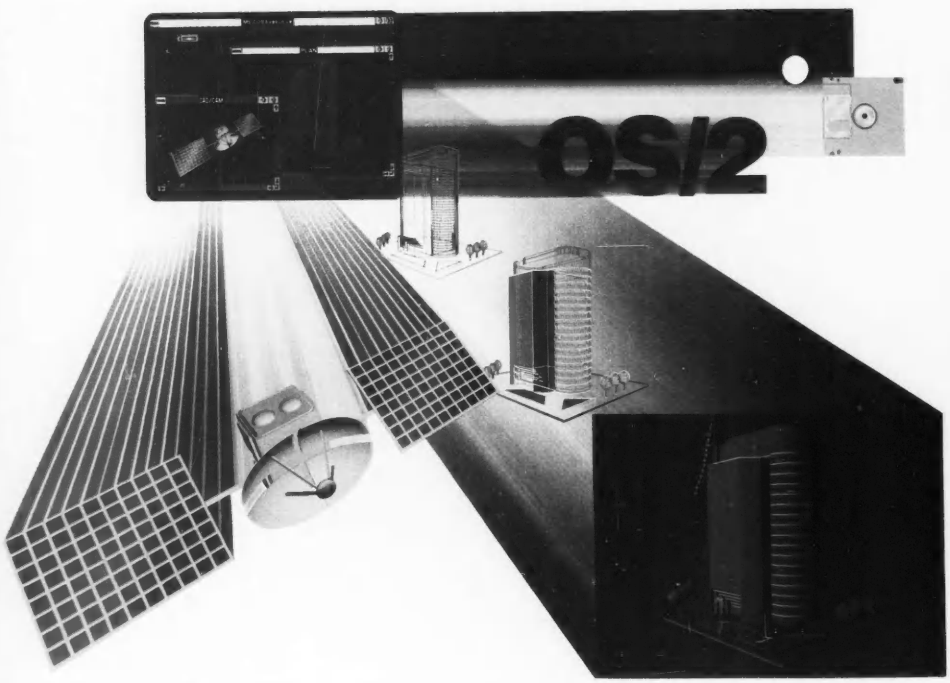

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Harnessing end-user computing without hindering it

Three classes of end-user applications lead to three graduated levels of MIS control

BY RICHARD BALL

At a recent EDP Audit and Security Conference, I posed the question, "What is end-user computing?" One attendee responded, "Power to the people!"

But multimillion-dollar mistakes have been made when puissance has been given to the populace. A story that appeared three years ago in the *Wall Street Journal* about several oil company executives who were fired for oversights costing millions of dollars in an acquisition deal is a case in point. The errors were traced to faulty financial analysis in a spreadsheet model.

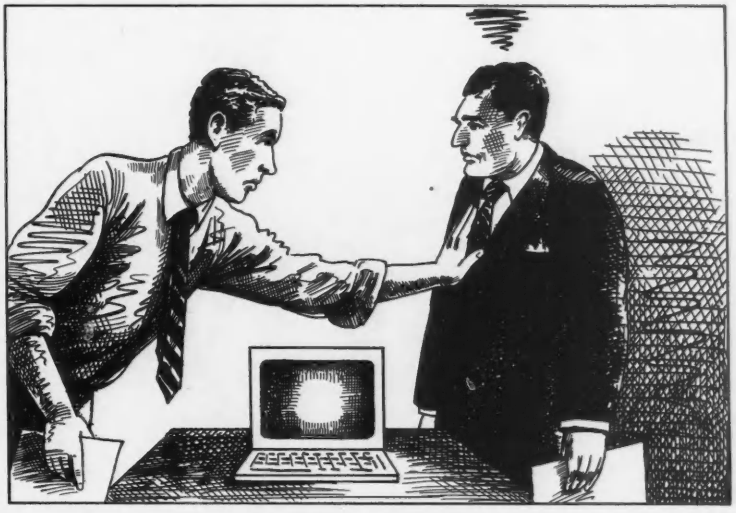
While end-user computing provides greater user control, companies need a concise system of checks and balances to achieve the productivity gains they seek.

In attempting to respond to end-user computing, MIS departments produced guidelines designed to harness user acquisitions of hardware and software. They also implemented information or end-user support centers and staffed them with junior applications programmers.

The problem, as was soon learned, is that power users know far more than junior programmers will ever know about 1-2-3 models and other end-user applications. While they are valid initiatives, something more than acquisition policies and information centers is required. Programming standards must be implemented to define and control end-user application development.

This is the critical juncture at which many companies find themselves today.

Ball is director of the Software Management Institute in North York, Ontario.



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"Any EDP professional should know what end-user computing is," one individual asserted at the conference. I beg to differ. Defining end-user computing is not a needless exercise but rather a necessary evil, since professional companies — and the departments within those companies — define end-user computing differently.

No definite definition

Recently, I conducted initial interviews with more than a dozen DP practitioners at a major corporation as the first step in developing corporate end-user policies and practices. I was surprised to find no consensus within the company concerning the definition and role of end-user computing. Out of the many views expressed, the following comments are representative:

- "End-user computing is computing done on a personal computer."
- "End-user computing includes programming done by users on corporate computers such as mainframes."
- "End-user computing includes office automation applications, both clerical and professional, such as word processing and electronic mail."
- "End-user computing includes any use of a traditional MIS-developed system accessed by a terminal."
- "End-user computing is personal computing done by business professionals."
- "End-user computing is programming done by amateurs."

This last definition defines end-user computing on the basis of professional training: computing done by amateurs with no formal training in the MIS disciplines of design, programming, testing and controls.

However, what about the MIS professional who designs and builds an application for herself? She may be skilled in computing, but there is something about developing an application by and for yourself that distinguishes it from traditional systems development, which has separation of duties. Authorization and controls issues are raised.

According to this way of thinking, shouldn't MIS professionals be equally viewed as end users — "MIS end users" as opposed to "user end users"? Then there are the MIS professionals who transfer to the user department and assume the identity of a user. What do we call them, "MIS-user end users"? It gets complicated.

The point of all this is that there are various definitions of end-user computing floating around, and the distinctions blur on close examination.

I offer the following working definition for the purpose of this article: End-user computing

- **'MIS end users' vs. 'user end users'**
- **Give the power user some elbow room**
- **Green-, yellow-, red-light technology**

refers to the use of computing technology in which the end user plays a dominant role in the definition, development and creation of automated processing and output. The end user assumes responsibility for tasks traditionally carried out by the MIS department. End-user computing may occur on any computing technology (that is, it is not limited to the personal computer) and may be done by anybody, including MIS staff.

Although this definition of end-user computing can be stretched to include office productivity applications such as electronic mail and word processing, its primary emphasis is on the programming or applications development aspect of end-user computing.

Having reached a definition, we can consider the development of standards for controlling end-user application development. We need a level of controls that will allow users to obtain the productivity benefits of end-user computing and also maintain a sense of control while, at the same time, safeguarding the company from serious problems.

I struggled with this issue at the company I was working for when it became clear that at least two classes of end users existed. One was the casual, light-duty end user who developed small applications to improve personal productivity. The second consisted of users who developed full-fledged applications imitating the production environment on a smaller scale.

IN THE PAST, MIS would often develop standards suitable for heavy-duty development that were absolute overkill for simpler applications. As a result, standards were developed and ignored. End-user computing is attractive precisely because MIS has not clamped down on it.

Application development guidelines, therefore, were needed that would harness the heavy-duty end user without clobbering the little guy who just wanted to do a one-hour spreadsheet in order to calculate his expenses for his trip to Niagara Falls.

In the past, MIS would often develop standards suitable for heavy-duty development that were absolute overkill for simpler applications. As a result, standards were developed and ignored. End-user computing is attractive precisely because MIS has not clamped down on it.

There is a pressing need for a sliding scale of end-user programming standards, based on the attributes of the application. While the attendees at the presentation on end-user computing at the EDP Audit and Security Conference agreed there was a need for a sliding scale of application development standards, only two of the approximately 80 companies represented reported having such standards.

Developing the standards

With this in mind, I set out to develop a scheme for classifying end-user applications and then to develop appropriate standards. First, I had to develop and define the criteria that would be used to classify a proposed application. I looked at the data — its importance and how it would be used. I looked at the proposed application itself — its size and complexity and whether it was stand-alone or linked. Finally, I looked at the size of the development effort. On this basis, I came up with the following three categories for defining the applications class: data attributes, application attributes and project attributes.

Data attributes. In considering the data, I asked questions such as, What are the attributes of the data? High or low volume? Is it data for personal use only, or would it be considered departmental or corporate in scope? For example, data that is used in an expense account calculation is essentially one-time or throwaway, while other data consists of company records that must be kept for years. Furthermore, will the data be employed for critical decision making or ordinary business processing?

Application attributes. The second characteristic to consider would be the attributes of the application that is

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under development.

What kind of technology is being used? Will the application be used only by the individual who developed it, or will it be used by others within the corporation? Will this application be used solely at the individual's discretion, or will it be run on some kind of regular basis?

Project attributes. The third characteristic to look at involves the development effort itself.

Is this a small- or large-scale effort? What kind of project control is warranted by the size of the effort?

The above criteria are used to put end-user applications into three classes: "A" for low risk; "B" for medium risk and "C" for high risk (see chart at right). Using A, B, C (rather than C, B, A) permits expandability to D, E, F and so on, in case the company later decides to extend the applications classes concept into the classic development environment.

The next step is to go back and fill in the specific criteria for each applications class and the development standards that will apply. If you adopt this approach, you will need to define the criteria for each class.

The criteria you choose will depend to a large extent on your EDP controls philosophy — tight, loose or moderate.

Controls defined as moderate should provide a reasonable degree of assurance that major problems will be avoided. I would typify the set of controls used in this model as moderate.

An application's overall classification (whether A, B or C) will be its highest rating in any of the three categories.

In order to be considered a Class A application, for example, it must be rated Class A in all three categories. If an application fails to meet the criteria for any of the three categories, it is automatically bumped to the next class. For example, if an application is Class A in terms of data and application attributes but Class C in terms of project attributes, it is a Class C application.

Applications classes

The attributes of an application determine its place on a sliding scale of standards

	Class A	Class B	Class C
Data attributes			
Application attributes			
Project attributes			
Associated standards			

Lenient ◄ Sliding scale of standards ► Strict

☐ Personal applications ■ Corporate applications

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Class A applications

Class A, the lowest risk class, has minimal associated controls and standards. Typically, this would be a small-effort program developed for light-duty personal use.

Data attributes. Class A applications should have a low volume of data that is neither sensitive (private or proprietary) nor strategic. The data is intended for personal — as opposed to departmental or corporate — use (see chart at left).

For example, data developed by an MIS development project leader to assist in project scheduling and assignments would be considered personal. The data in this class is not intended for use in any other application or by other individuals.

Application attributes. A Class A application is typically developed at an individual's discretion. A good way to test whether an application should be considered personal or corporate is to ask, "When this person moves to another assignment, will his replacement be expected or required to use this program?" If the answer is yes, then this is a corporate application that belongs in Class B or C.

In addition to belonging to this class, the processing complexity of the proposed application must be low and well within the grasp and capability of the end-user developer. Finally, it must be developed on a standard, approved technology.

Project attributes. Class A applications represent small development efforts. For this model, the time limit is set at five workdays. For some organizations, the standard for Class A may be as low as one workday. Whatever cutoff is used, the main point is that the development effort is sufficiently low as to not warrant formal approval or project management.

Examples of Class A applications include the use of personal productivity tools such as E-mail, electronic calendars and word processing. Simple spreadsheets and straightforward data base queries and reporting — which do not involve data base updating — also fall squarely into Class A.

Standards for Class A

Just like the "eight items or fewer" express line at the supermarket checkout, Class A is designed to bypass lengthy lineups and facilitate productive use of end-user computing technology. As a result, Class A controls are

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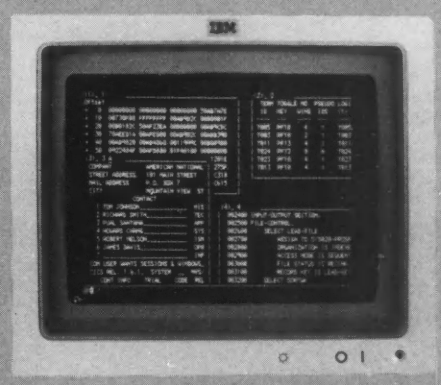

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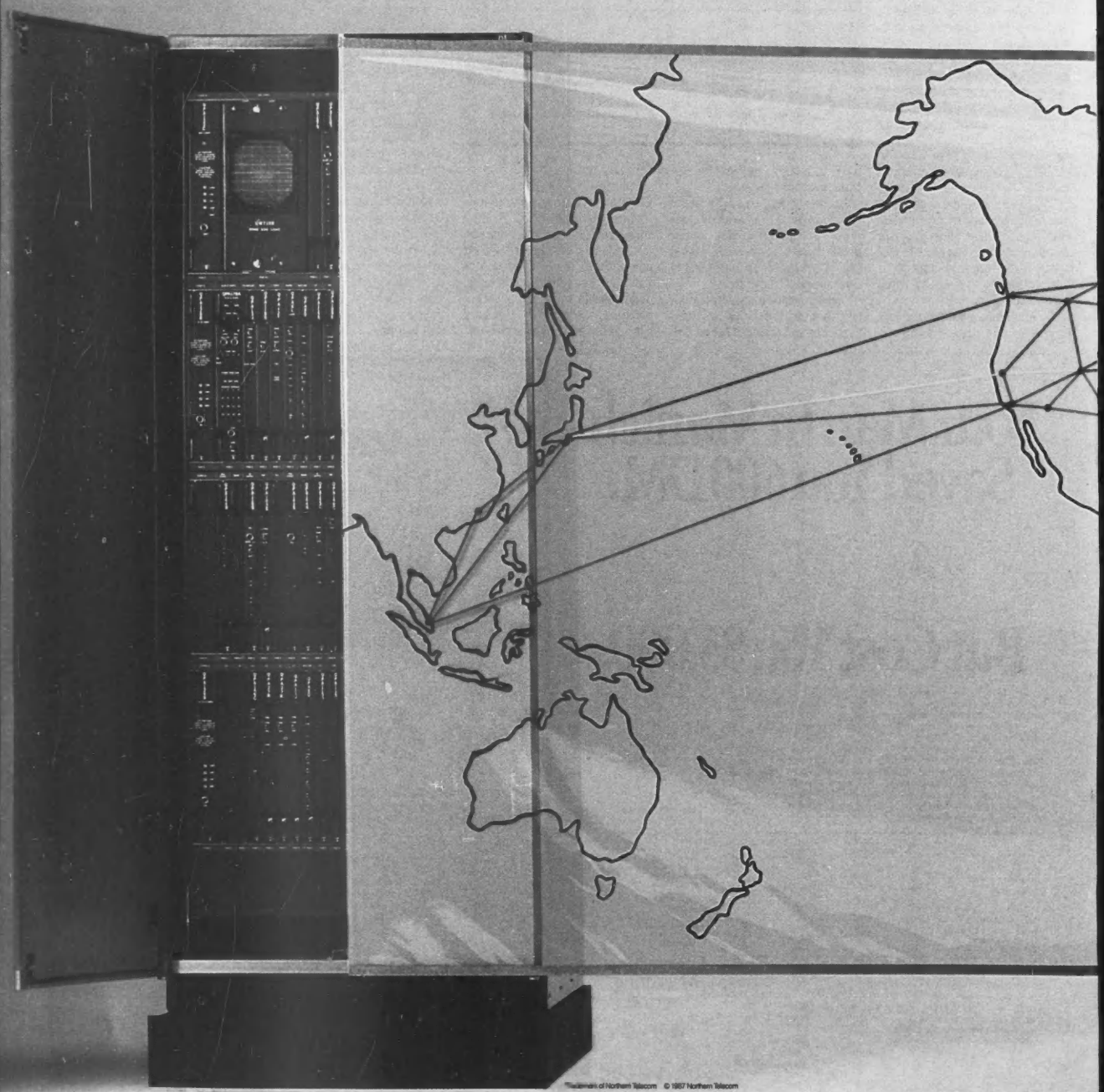

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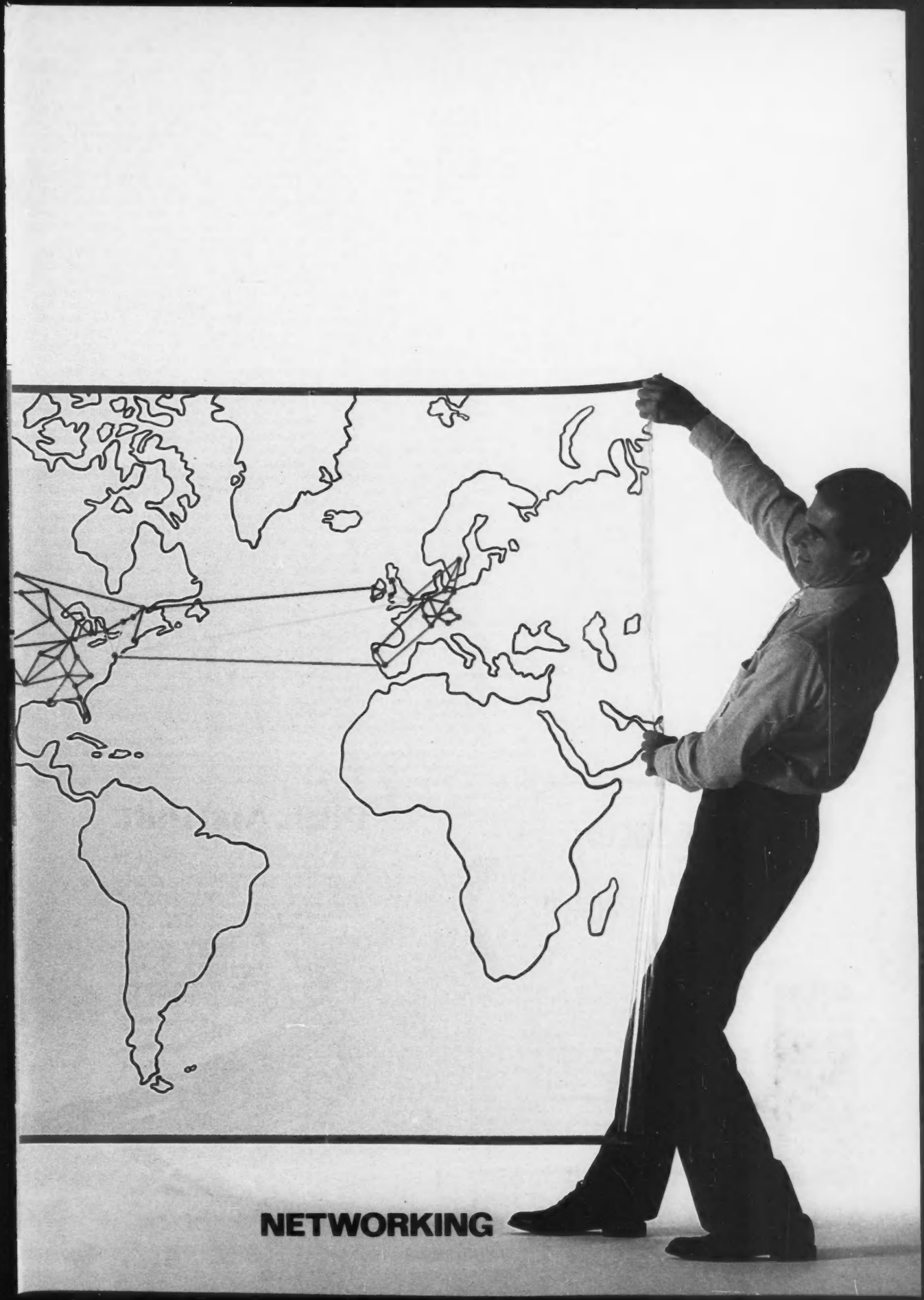
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Applications matrix

A variety of traits could push an application up to Class C — a tightly controlled end-user application

	Class A	Class B	Class C
Data attributes	• "Personal" • Nonstrategic • Low volume • Independent	• Departmental • High volume • Used by other programs	• Strategic or sensitive • Used to update corporate data base
Application attributes	• "Personal" • Stand-alone • Low complexity	• "Corporate" • Used by more than one person	• Complex • "Yellow" or "red" technology • Updates corporate data base
Project attributes	• One to five workdays • No formal project management warranted	• Six to 20 workdays • Some project approval, project management warranted	• Twenty-one to 40 workdays • Formal project approval, project management • More than 40 workdays — use system development standards
	General standards:	*Class A standards plus:*	*Class B standards plus:*
Associated standards	• Use passwords • Back up data • Use common sense • Label	• Controls analysis recommended • Must document • Must register with end-user computing applications library • Label	• Controls analysis required • Feasibility and cost-benefit analysis • Data base administrator's approval to update corporate data base • Label
Examples	• Electronic mail • Word processing • Data base query • Simple spreadsheet	• Spreadsheet used on a scheduled basis • Data base reporting program used by more than one person	• Micro-DBMS application • Complex spreadsheet • Simple spreadsheet, used for critical decision support

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purposefully kept to a minimum. The following is a list of recommended standards:

- Obtain authorization to develop the application. Professionals often have implicit authorization by virtue of their job level; clerical staff members normally must get it explicitly from their supervisor.
- Use passwords whenever possible.
- Back up your data and application.
- Document, as you feel appropriate.
- Label the application and any output reports as "Class A."

Class B applications

Class B applications are medium-risk applications that fall between Classes A and C. The move from Class A to Class B marks the move from personal to corporate computing.

Data attributes. There are several attributes of data that may cause an application to move from Class A to B. If the volume of data being processed is high, more controls are warranted. If the data is departmental or corporate in nature, then the application must be documented.

A greater degree of control is also warranted if the data will be passed to another application or be used by several people. If the data fits any of these descriptions, the application belongs in Class B.

Application attributes. An application should be classified as Class B if it is used as an operational or production system.

This means it is run on a scheduled or at least a recurring basis. Its use is associated with the job position rather than the individual. Use of the application is not discretionary. The application will be part of the user's ongoing business operation. This warrants the firmer standards associated with Class B, such as mandatory documentation.

Lastly, the application gains Class B status if it uses data base software for personal computers. This type of software typically has more associated controls issues than a spreadsheet, for example, warranting more rigorous attention.

Project attributes. The estimated amount of effort of a Class B application should not exceed 20 workdays, although for some companies this limit may be too high. The point is that a moderate amount of project approval and project management is warranted by the size of the effort.

Standards for Class B

The following standards apply to Class B in addition to those already mentioned for Class A:

- Perform a cost-benefit analysis. If the application is Class B because of its project size (six to 20 days), some form of cost-benefit analysis should be performed. End users may spend weeks doing something MIS could knock off in a couple of days. (The reverse is also true.)
- Perform feasibility and alternatives analysis. Both the cost-benefit analysis and feasibility and alternatives analyses may be cursory and casually documented, but they should not be bypassed.
- Perform Class C controls analysis and testing, as appropriate.
- Document the application according to standards provided by MIS.
- Label the application and any output reports as "Class B."
- Register the application with your company's end-user computing applications library. Many organizations keep a catalog of end-user-developed applications in order to promote reusable end-user applications and keep end-user applications under control. Class B and Class C applications should be registered in it.

The main difference between Class A and Class B standards is that Class B applications must be documented. Cost-benefit analysis, feasibility and alternatives analysis, controls analysis and degree of testing are left to the individual's discretion. However, while the individual is given considerable latitude in Class B, it should be made clear that he is accountable for the results of end-user computing, regardless of the class or associated standards.

The standards associated with Class B applications have further implications for MIS that may not be readily apparent. Many users do not possess the necessary knowledge or skills to perform many of the activities suggested here, such as cost-benefit or feasibility and alternatives analyses, controls analysis or structured testing.

MIS must provide end users with clear standards and guidelines for performing these activities. Every company doing an appreciable amount of end-user computing should have a standards and practices manual detailing such guidelines and describing the end-user computing applications classes.

Class C applications

Class C applications are high-risk or large end-user development efforts that warrant more formal

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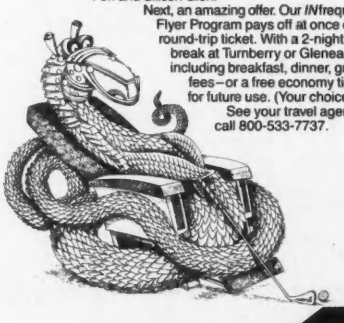

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project management and controls. They are still small enough, though, to fit the definition of end-user computing and do not require the full-scale development process to be applied.

Data attributes. An application is Class C if the data is sensitive or of strategic value. Such data includes employee medical records residing on a PC and spreadsheet data used in critical decision support.

Application attributes. An application should be classified as Class C if it involves complex processing such as pension calculations on a PC that will be used by the human resources department to determine employees pension allowances.

If an application uses a procedural language, it should be labeled Class C. Most end users should not develop applications using procedural languages (such as Cobol or Basic) because of the greater risks due to the higher degree of programming skill needed.

If an application uses status "yellow" or "red" technology — either old technology that has fallen into corporate disfavor or new technology that is not yet part of the corporate-approved technology set — then it should be classified as Class C.

Project attributes. A project in this class will take from 21 to 40 workdays to complete. A considerable amount of project approval and project management is warranted by the size of the effort. Projects that need more than 40 workdays to be completed should be handled using conventional MIS system development and project management practices.

A typical example of a Class C application would be a microcomputer data base application in which the technical complexity, risk of error and need for controls is high. Another example would be a micro application that produces data to be fed to a corporate data base.

The rule of thumb here is that the controls for the micro application that produces data which is later uploaded to a corporate data base must equal the controls of the corporate data base application.

Standards for Class C

Class C includes heavy-duty end-user applications. The following standards should be followed in addition to those mentioned for Classes A and B:

- If the application is Class C because of its project size (21 to 40 days), a cost-benefit analysis, with recommended assistance from MIS, should be performed.
- Perform feasibility and alternatives analysis. Questions must also be asked about the personnel involved. Is this really an appropriate application for an end user, or should a professional programmer do it?
- Obtain formal, explicit project approval.
- Make appropriate use of the company's EDP controls analysis process.
- Develop test cases with predetermined results; ask someone else to test the program, as appropriate.
- Label the application and any output reports as "Class C."
- Register the applications with your company's end-user computing applications library.

The main difference between Class B and C standards is that the latter applications must undergo more rigorous analyses, project approval and testing.

A way of life

Using application classes, with the associated escalating standards, can be a key strategy for controlling the end-user programming environment. However, to achieve the desired results, a corporation must accept the classification scheme as a way of life.

Therefore, company policy should enforce all end-user applications to be classified as either A, B or C.

Such a policy guarantees that all potential end-user applications are evaluated prior to development. It ensures that appropriate development standards are followed.

Finally, it permits applications to be labeled according to their class, which makes users of output reports aware of the standards that went into the development of the application. It also helps promote and maintain an awareness of the application classes concept within the organization.

The spreadsheet savior

Now that end-user computing applications classes have been described in depth, let's try the scheme on a case study. Would this approach have prevented the oil company executives mentioned earlier from being fired? Let's look at the evidence.

Because the application was being used for critical decision support, it would fall into the highest class, C, regardless of the development effort or technology being used. This means this spreadsheet would have been subjected to the rigors of a formal feasibility study, and alternatives analyses would have been undertaken. Asking the question, "Are you the right person to do the job?" may have found someone with more skill in spreadsheet programming for the task.

Further, formal, explicit project approval would have been obtained to develop the application, highlighting management

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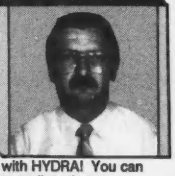

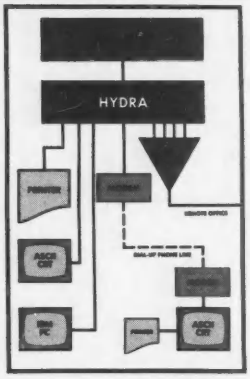

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concern for its correctness.

Next, the company's EDP controls analysis process would have been used to identify risks and take steps to minimize them. Today, this might entail passing the resulting application through a spreadsheet audit tool. Test cases with predetermined results would have been developed, helping to ensure correctness. Then the resulting application would have been tested by an independent person. Finally, with "Class C" appearing on the output report — while assuring the executive users that the application had been developed with the appropriate controls — it would have been a reminder that there are degrees of risk associated with the use of any computerized output, especially an ad hoc application being used for the first time.

While none of these steps could have guaranteed the correctness of the resulting spreadsheet model, taken together they would have vastly improved the chances of preventing that costly mistake.

MIS's success in implementing standards often falls dismally short of the good work that has gone into the development of the standards themselves. All too often, the new standards get published in an MIS manual or bulletin, and that is as far as they go.

Rallying end users

For these new standards to be successfully implemented, they must be widely accepted. This means as many people as possible should be involved in the development of the end-user computing applications criteria and resulting standards.

Once the standards have been accepted, the next hurdle is to ensure widespread awareness among end users. To achieve this, MIS needs to gain the support of user managers and provide resources to help them fulfill their responsibilities for maintaining a controlled computing environment within their departments.

There are a number of ways to approach this objective. In some companies, people in the user departments are assigned to coordinate or oversee end-user computing activities. In other companies, the information center can act as adviser and facilitator.

MIS's success in implementing standards often falls dismally short of the good work that has gone into the development of the standards themselves.

Regardless of the organization, the user supervisory community must be informed of end-user computing standards. Implementation plans must, therefore, take into account a strategy for reaching the supervisory level.

Ensure compliance

Once MIS achieves acceptance and awareness of the standard, it needs to ensure compliance. Following are a number of methods, which may be used in combination:

- Make compliance assurance a user supervisory responsibility.
- Make it the responsibility of end-user coordinators.
- Make it the responsibility of the information center.
- Make EDP Internal Audit aware of the standards and request their assistance in checking for compliance.

The appeal of end-user computing is that it frees users from MIS constraints. The standards for end-user programming, then, must represent a careful balance between freedom and constraint. They must be flexible, based on the attributes of the end-user application and should be developed in consultation with users whenever possible.

Standards development must be followed by a carefully planned implementation program. Following this, the company must take steps to ensure that the user community is complying with the standards. Properly done, this can help build and strengthen the MIS-user partnership as MIS helps user management manage end-user computing done by its staff. •

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'The Rule of Inverse Proportions'

BY KENNETH ROSS

True or false: The cost of training and support is directly proportional to the cost of hardware and software. In other words, if today's IBM Personal System/2 Model 30 costs one-third what the basic IBM Personal Computer cost five years ago, then the cost of training and supporting the PS/2's users will also be one-third the cost on the PC.

Or, if a vendor drops the price of its accounting software from $5,000 to $200, then that package will now need one-twenty-fifth the amount of training and support. And, of course, if a package is bundled free with the hardware, then it shouldn't require any training and support at all.

Of course, there is no direct relationship between these two costs — so why does almost everyone act as though there were? In fact, according to Ross's Rule of Inverse Proportions: "As the cost of hardware and software decreases, the cost of training and support will increase."

Why? Simply because many of these less expensive machines are going onto the desks of less educated and less motivated users. These users require far more hand-holding than the middle managers and professionals who were the early adopters of PC technology.

The lack of appreciation of the true nature of Ross's Rule by both systems managers and nonsystems managers has contributed to a serious lack of organizational commitment in the training and support area. Various industry surveys consistently place end-user computing near the top of everyone's priority lists. Nevertheless, industry surveys also indicate that nine out of 10 end-user support groups are understaffed and underbudgeted.

The support gap

A gap has developed between the perception of the importance of end-user computing and the degree to which it is actually supported. And this training and support gap is widening.

Although MIS, information center and micro managers all contribute to the widening of this gap, they do not bear the entire burden. Upper management continues to promote information systems as the strategic means to gain a competitive edge in the world marketplace, while information center and micro support budgets shrink, and end-user requests for support escalate.

Since 1985, the dollar volume of microcomputers shipped has exceeded that of mainframes. This means the information systems of the future will increasingly be built around desktop systems. Whether these systems are stand-alone, attached to networks or linked to mainframes, more and more of the total computing intelligence will be distributed to the end user's desktop. Well-trained, productive end users will be of growing importance to the long-term strategic success of every enterprise.

At the same time, in the last two years, the ratio of support staff to end users has decreased by 32%. Information center and micro support staffs are regularly cut back in the face of increasing work loads. New technologies, more PCs, more complex products and more demanding users all call for more attention. Micro support groups are often forced to reduce end-user service levels to keep up with their basic responsibilities.

The immediate result of this is lower end-user skill levels, reduced support services and less productive end users. The long-term impact will be less competitive companies.

Ironically, almost no one has a problem with the idea of spending money on a regular, ongoing basis for hardware maintenance. But the idea of "end-user maintenance," providing on-going training and support for end users, does not seem to have caught on.

Training and support are not variables. Rather, there is a base level of ongoing services that should be planned and budgeted for every computer user. Many people, however, seem to believe just the opposite — that once a user has been trained and has undergone an initial break-in period, he is self-sufficient and will rarely be heard from again.

While learning curves tend to plateau and most users ask fewer questions over time, most micro managers agree that users make up for asking fewer questions by asking more difficult ones. Questions relating to a product's complex features, for example, require time-consuming research.

And justice for all

Although many companies require that each hardware and software purchase be cost-justified, few consider the long-term costs of training and support as a part of that cost-justification.

If those costs were built in at the "front end" of the cost-justification process, then upper management would be far more comfortable in allocating those dollars to the support group throughout the life of the system.

Just as the long-term costs of equipment maintenance are usually considered, companies need to include end-user maintenance in their cost-planning equations. •

Ross is president of Atrium Information Group, Inc. in Fairfield, Iowa, developer of the Micro Resource Manager program for analyzing end-user computing resources.

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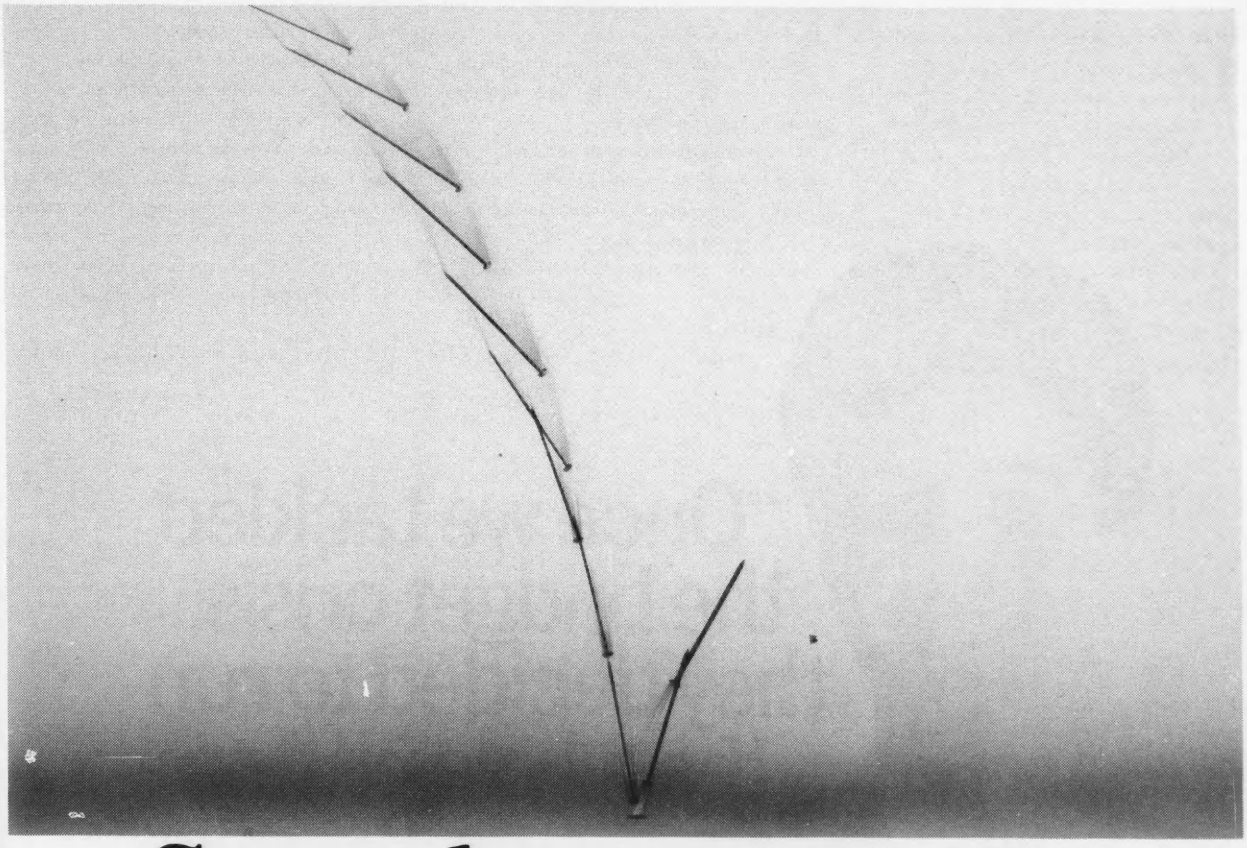

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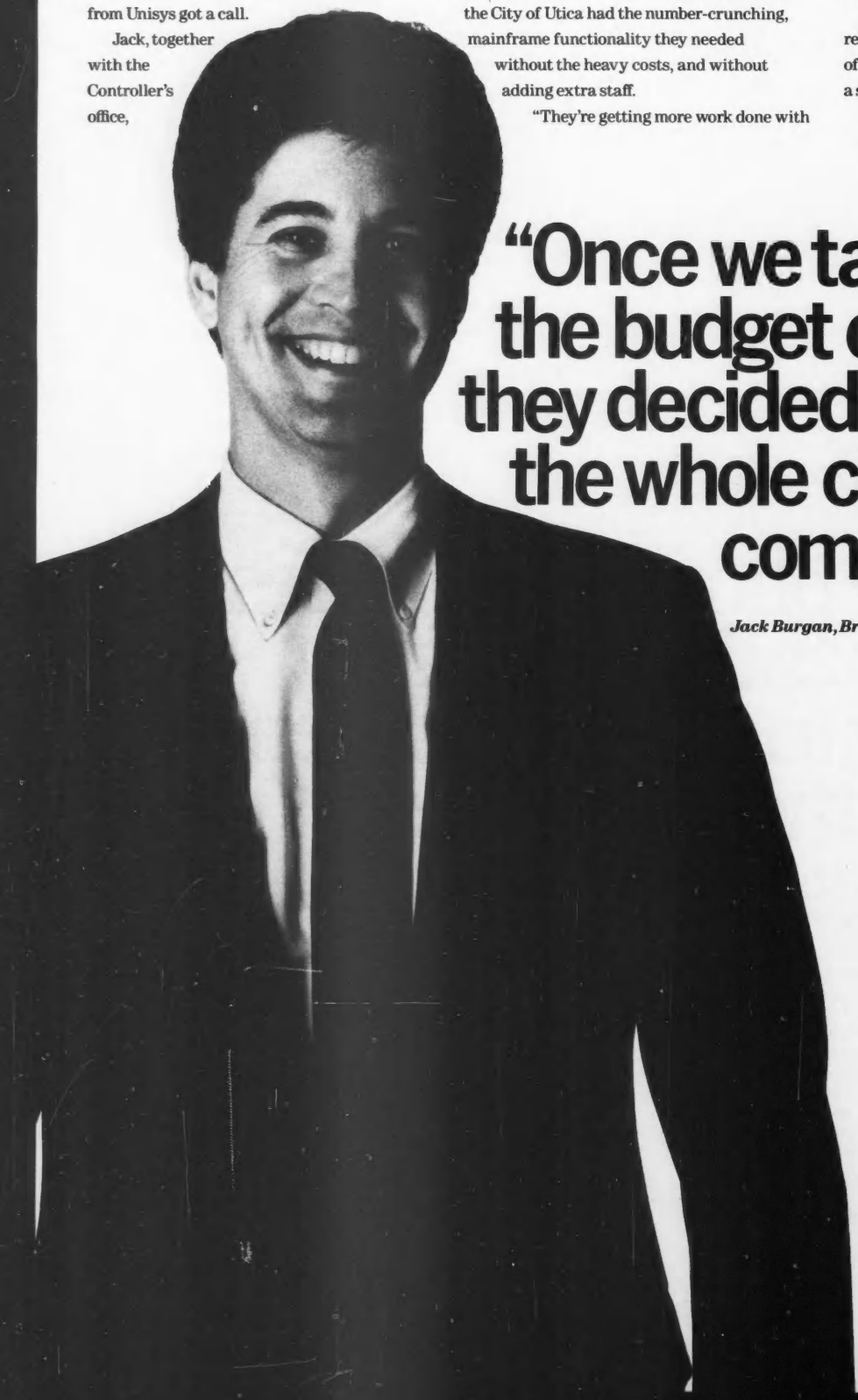

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Jack Burgan, Branch Manager, Unisys.

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TAKING CHARGE

David Ludlum

Probing the partnership

"Implementing the Vision" of an information systems strategy served as the theme of the Society for Information Management's annual conference, held in Seattle earlier this month.

Among the motifs of the discussion, one permeated the gathering like the autumn fog that regularly settled in the watery, low-lying areas of the Emerald City in the morning. That was the importance of a partnership between information systems managers and senior executives, an ongoing concern of the society.

Managers came to the conference with different views. Not suprisingly, one information systems manager who reported a good working relationship with his senior management was accompanied by his chief executive. Harmony was evident in the comments of David Scheibe, chief of the office of Management Information Systems with the State of Washington's Department of Transportation, and his boss, Secretary of Transportation Duane Berentson.

Scheibe said his biggest concern is determining whether his organization is automating the right thing. Just measuring return on investment doesn't do the job, he said. Berentson articulated the same concern. "It's very possible that over a period

Continued on page 109

DP chief aims higher

Plans to parlay success into senior exec role

BY ROSEMARY HAMILTON
CW STAFF

READING, Mass. — For many information systems professionals, landing a job as the director of MIS at a multimillion dollar company would be the ultimate career goal. Not so for Patricia Stadel.

Stadel plans to move beyond her position as MIS director of Addison-Wesley Publishing Co., a publisher of textbooks and software that had $150 million in sales last year. She sees the director's position as another step in her climb to a senior executive post, preferably at Addison-Wesley.

"I agreed to take this job in the context of a larger opportunity," Stadel says. "I've built systems, and now I'm bored with that. I rolled up my sleeves in the past, and now I prefer not to."

Stadel's title is administrative vice-president and director of information services, which she says "is positioning for my future assignment here."

Straight shooter

She pulls no punches when discussing her feelings on MIS. Stadel has derived plenty of satisfaction from this business, which she says "addressed my need for closure — something has to work or not work." But Stadel never intended to make it her life's work. She has no charming stories about tinkering with electronics or programming as a child. Instead, she says, she has always been drawn to management tasks and found that she could fulfill that need as she climbed the MIS ladder.

"It happens to have been the field that was open when I came on the job market," Stadel says. "I would say that it was more opportunistic than careful planning."

PROFILE
Patricia Stadel

Position: *Administrative vice-president and director of information services, Addison-Wesley Publishing Co.*
Mission: *To rejuvenate applications, create a service-oriented organization.*

One of Stadel's employees agrees that she is more manager than technologist. "She's a manager, and that's what she's looking for in the people that report directly to her. She wants managers, not doers," says Bill Webster, manager of strategic projects.

Stadel originally wanted a career in engineering. But it was the late 1950s when she arrived at Stanford University, and she found little demand for female engineers.

Stanford faculty members recommended computing as a promising new field with greater opportunities for women. Since the school did not offer a degree in computer science at that time, Stadel opted for the next best thing, mathematics.

Although she expresses no

Continued on page 110

Users wield more clout as MIS drafts budgets

BY DAVID A. LUDLUM
CW STAFF

The competitive quest to deploy information technology is being tempered with a cautious view of the business outlook as MIS executives — and users — shape 1988 information systems budgets.

Managers in the MIS and user communities must weigh a raft of concerns peculiar to their industries, so outlooks for next year's budgets vary significantly. Oil company executives are speaking hopefully of a modest rebound from contractions in recent years, while their counterparts in financial services wonder if a run of boom years is coming to an end.

But one pattern is being repeated across industries: Users are driving the preparation of information systems budgets, with MIS personnel advising the users and "sizing and pricing" their requests, in the words of Michael Simmons, president of Fidelity Systems, Inc., the systems arms of the Boston-based mutual fund giant.

"I think users are getting more literate, and they're asking for ways to use the technology better. The users are getting smarter," Simmons said.

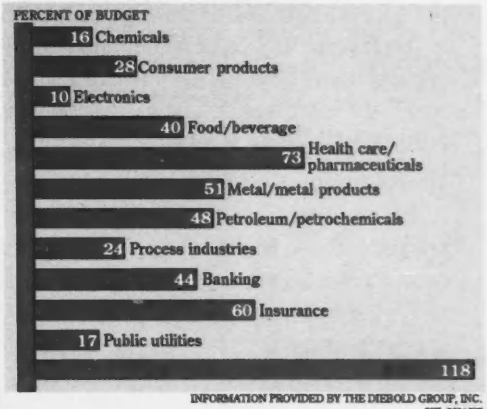
At the same time, in many industries a substantial portion of spending on information systems is taking place outside MIS department budgets (see chart below).

Economic forecasters generally are calling for modest growth in the 1988 election year, in the range of 2.5%. But as usual, the economic outlook is

Continued on page 108

What you don't see

1986 spending, by industry, for information systems outside MIS budgets as percentages of MIS budgets



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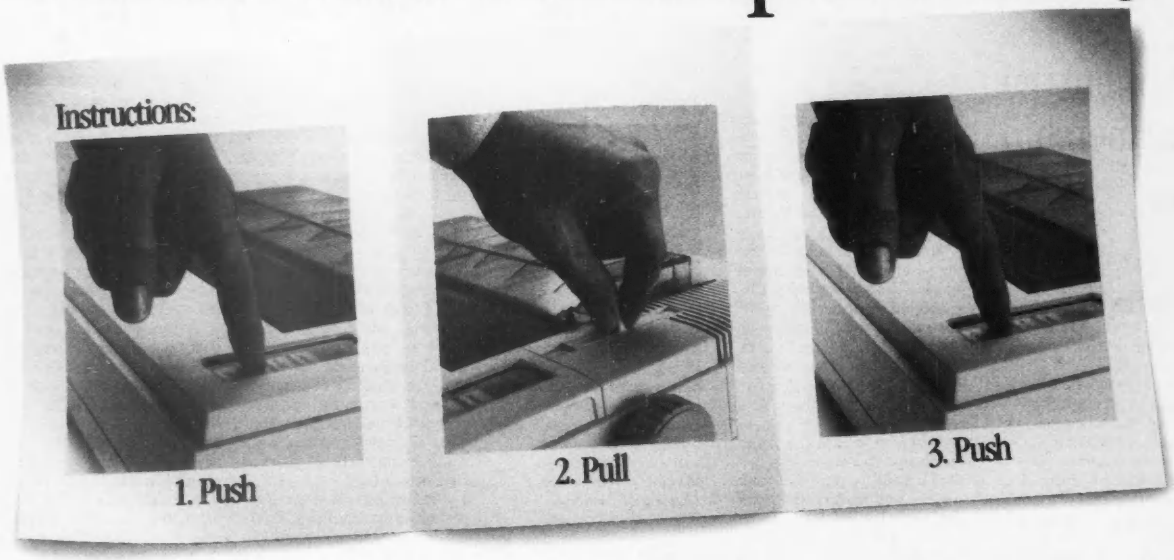

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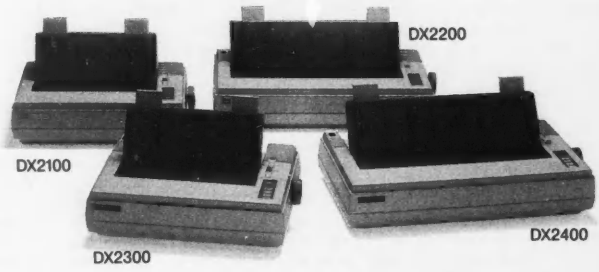

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LOCAL HAPPENINGS

NORTHEAST

New Cumberland, Pa., Nov. 11. Association for Systems Management (ASM), Central Pennsylvania Chapter. Artificial Intelligence, with Jack Barr of Cullinet Software, Inc., and The Oasis Message Processing System, with Jim Lightly of Pennsylvania Blue Shield. Sheraton West. 5:30 p.m. Contact: Mark Anderson, 809 Acri Road, Mechanicsburg, Pa. 17055.

Westbrook, Maine, Nov. 18. Data Processing Management Association (DPMA), Maine Pine Tree Chapter. Achieving Personal Excellence, with Molly Marley. Verillo's. 5 p.m. Contact: Delta Chemicals, Inc., Searsport, Maine 04974.

Boston, Nov. 19. Society for Information Management, Boston Chapter. Monthly meeting. Anthony's Pier 4. Contact: SIM, P.O. Box 116, Newton Lower Falls, Mass. 02162.

Boston, Nov. 20. Society for the Management of Professional Computing, Inc. Member Panel on IC Experiences, with Ed Gaudette of Norton Co. Anthony's Pier 4. 11:45 a.m. Contact: SMPC, 715 Boylston St., Boston, Mass. 02116.

SOUTHEAST

Columbia, S.C., Nov. 5. ASM, Midlands Chapter. Coping with Rapid Micro Technology Change, with David Sweatman of Companion Systems. Quality Inn, I-20 and Broad River Road. 5 p.m. Contact: George F. Hayhoe, 118 Park Ave. S.E., Aiken, S.C. 29801.

Chamblee, Ga., Nov. 10. ASM, Atlanta Chapter. Artificial Intelligence, with William Underwood of AI-Atlanta. Holiday Inn Chamblee-Dunwoody, 4386 Chamblee-Dunwoody Road. Contact: Jane Roberts, HBO & Co., 1 Ravinia Drive, Atlanta, Ga. 30346.

Charlotte, N.C., Nov. 19. ASM, Queen City Chapter. The Leader Manager, with Steven C. Slater of Wilson Learning Corp. Cosmos Steak House, 5100 E. Independence Blvd. 6 p.m. Contact: Danny Fields, Metro Information Services, Suite 140, 7 Parkway Plaza, Charlotte, N.C. 28217.

MIDWEST

Indianapolis, Nov. 5. ASM, Indiana Chapter. Assuring Quality in Externally Developed Systems, with Rick Nashleanas of Eden Systems Corp. Holiday Inn Southeast, I-465 and Emerson Ave. 6 p.m. Contact: Lloyd Louks, Bank One Indiana, 450 E. Washington St., Indianapolis, Ind. 46277.

Des Moines, Iowa, Nov. 9. ASM, Des Moines Chapter. Evolving Role of DP Professionals, with Robert Reese of Washington University. The Howard Johnson Inn, Merle Hay Road. 5 p.m. Contact: Joleen Montag, Integrated Resources Life Insurance Co., 3737 Westown Pkwy., West Des Moines, Iowa 50265.

Lafayette, Ind., Nov. 12. DPMA, Sagamore Chapter. Certification for the Computer Professional, with George Eggert. Judith Painter Catering, 101 Plaza Lane. 5:30 p.m. Contact: Joan Vaughan, Aluminum Co. of America, Box 7500, Lafayette, Ind. 47902.

WEST

San Francisco, Nov. 4. Association for Women in Computing, Bay Area Chapter. Computer Systems to Management Consulting: Making the Transition, with Gary Enersen of Enersen and White Associates. Stagecoach Restaurant, 44 Montgomery St. 5:30 p.m. Contact: AWC, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

Oakland, Calif., Nov. 19. Golden Gate Chapter, Association for Computing Machinery. Monthly meeting. El Caballo, 67 Jack London Square. 5:30 p.m. Contact: ACM, Box 26044, San Francisco, Calif. 94126.

El Paso, Texas, Nov. 24. DPMA, El Paso Chapter. Auditing of Operating Systems, with Debbie Pavelka. Location not determined. 5:30 p.m. Contact: Steve Tarro, Las Cruces, N.M.

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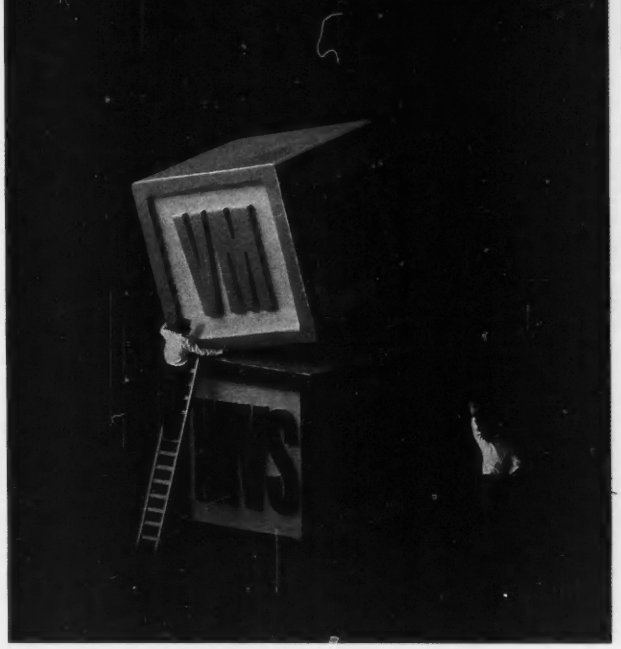

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The budget process

Uncertainty is one constant in preparing an information systems budget, according to Michael Simmons, president of Fidelity Systems, Inc., an arm of Boston-based Fidelity Investments.

"You always have concerns with trying to be the most efficient you can be as you plan for what is basically an unknown business year," Simmons says.

"The key thing is that no one knows what the economy is going to be like," he adds.

Last week brought a long-awaited stock market setback, a development that could affect Fidelity's profits.

"But they've been predicting it will crash for two years in a row," Simmons notes, and predictions for the future course of the market and the economy remain diverse.

As with more and more organizations, Fidelity's systems budget is driven by users' requests for services.

"We evaluate them — size and price — and then evaluate current business," Simmons says.

Those calculations are put into three alternative business scenarios — best case, worst case and a middle course. "You do a down, a flat and a growth," Simmons says. "You keep them up-to-date. You have contingencies."

If the business outlook changes, the organization can gradually shift from one budget plan to another.

Michael Simmons

Then there's the supply side: the technology that will be available and its cost.

For now, Simmons does not foresee technological breakthroughs that would alter the 1988 budget outlook. But there may be increased costs beyond the firm's control, such as IBM's prices.

"We're becoming a bit more sensitive to the controllable costs," Simmons says.

"Most people can plan their technological growth. After you've done it three or four years, you get pretty good at it," Simmons adds.

DAVID LUDLUM

MIS budgets

CONTINUED FROM PAGE 105

providing only limited guidance for the preparation of systems budgets.

One reason is that the prospect of slow growth might prompt companies to increase MIS spending in order to boost market share as easily as it would lead them to respond by moderating their spending.

Another reason is simply that the outlook for 1988 is uncertain. That is particularly true in financial services, where business can fluctuate with the volatile securities markets.

"You've got doomsayers warning we could have a major depression, while others are saying the Dow [Jones Industrial Average] could reach 4,000. That makes planning a little tougher," Simmons said in the midst of last week's wild stock market gyrations.

Users influence planning

Furthermore, with users driving information systems spending, the impact of a given economic outlook on information systems budgets is even less certain.

"As [corporate] budgets tighten, the users hopefully will be tightening their development expenditures. But it is not necessarily going to happen that way. They could continue their expansion and make up for it in other areas," said William Anderson, senior vice-president and director of the Information Systems Division at Prudential-Bache Securities, Inc.

Anderson said his division's 1988 budget has not been set yet, but the current plan, based on users' requests, includes adding 50 software development people to the current 450. He also will be replacing an IBM 3090-400 mainframe with a 3090-600 and adding direct-access storage capacity.

At Fidelity, Simmons said he expects to continue hiring DP professionals, but at a slower rate than this year, which has seen more than 200 hires to date, including 123 through an employee-referral plan featuring a drawing for a top prize of a Mercedes 300E sedan.

An informal survey of MIS directors finds other organizations pursuing varied courses, often heavily influenced by the recent past.

In another service industry, Massachusetts Mutual Life Insurance Co.'s systems budget is expected to rise "in the double-digit range," although much of that will reflect moves made this year, says Ken Cardwell, senior vice-president in charge of the Corporate Services Division.

The division will maintain its current level of DP staff, but the personnel budget for next year will rise to accommodate pay raises and this year's hiring.

Cardwell says he expects more work for the applications staff with development of systems to track individual life and group accident and health policies but that he plans to increase productivity with new tools.

Massachusetts Mutual's 1988 systems budget also will reflect this year's addition of two mainframes — an Amdahl Corp. 5890-300 and an IBM 3090-200. "Obviously we will get the full brunt of that next year," Cardwell says.

In the oil industry, on the other hand, Allen N. Smith, manager of corporate systems at Atlantic Richfield Co. in Los Angeles, forsees a 3% to 4% increase in the systems budget, in line with budget moves throughout the corporation.

"We're being very cautious," while trying to reverse the trend of cutbacks in recent years, Smith says. Systems executives are feeling pressure from users who are being held accountable for their own productivity, he says.

Smith recently attended a meeting of oil industry systems managers and found many of them facing similar situations. "Generally there will be flat to modest increases," he says.

The Du Pont Co. is another industrial firm anticipating a modest increase in information systems spending next year, according to Henry Morneau, director of planning and development for the corporate Information Systems Department.

Rather than being increased significantly, resources will be redeployed from traditional "financial-oriented systems" to newer applications such as electronic data interchange, Morneau says.

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Probing

CONTINUED FROM PAGE 105

of time, we continue to do things that may not be necessary, even if we do them very well," he said. Berentson added that any good chief executive officer has got to appreciate what was going on at the conference.

But another manager of information from a large Fortune 500 company, who requested anonymity, deplored a lack of understanding of information systems on the part of senior executives.

Chief executives are often unaware of the potential of information systems and look upon them as a portfolio of backroom applications, this manager said. "We are really unrecognized as a strategic resource," the manager added.

So what's an information systems executive to do in that situtation? One answer came from John Hammitt, vice-president for information management at Pillsbury Co. "We have the responsibility to make the partnership work," Hammitt said during a session with reporters dubbed a "press/CIO roundtable" (although the participating executives expressed some disdain for the title chief information officer).

That makes sense, since the partnership is probably more pivotal to the success of information systems executives than to CEOs, although it leaves open the question of how the subordinate in the relationship is to go about forging the partnership.

But for every information systems executive trying to enlighten his senior management to the strategic value of information systems, there is probably a senior executive or management team trying to enlighten an information systems executive to the same concept.

Shedding some light on those situations, the conference offered a look — perhaps a glimpse of things to come — at the technologically astute chief executive. That came in a panel discussion among three CEOs on what corporate chieftains should do to promote successful implementation of systems.

No doubt the most technologically insightful among them, Microsoft Corp. cofounder Bill Gates, offered a fairly stark view of the chief executive as technological leader.

Gates said that his senior managers take a fairly hands-off approach to information systems management, focusing on product managers. But if those business managers can't get the information they want, senior managers talk to the MIS people. "Sometimes we have to hassle them — say, 'When can we get that out?' " Gates said.

"In our company, we are unafraid to to ask those questions, and if you don't know the answer, you better say you don't," Gates added. That might ease the anxiety of those information systems managers lamenting senior executives who don't understand systems.

Ludlum is *Computerworld's* senior editor, management.

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Third Annual Excelerator User Conference. Boston, Nov. 1-4 — Contact: Index Technology Group, One Main St., Cambridge, Mass. 02142.

International Software AG Users' Conference. Miami, Nov. 1-5 — Contact: Software AG, 11800 Sunrise Valley Drive, Reston, Va. 22091.

Conference on Expert Systems Technology in the ADP Environment. Washington, D.C., Nov. 2-3 — Contact: Lloyd F. Arrowood, Program Chair, Oak Ridge National Laboratory, 4500-North, Mail Stop 207, Oak Ridge, Tenn. 37831.

The Supergroup (HP 3000) Users Conference — East. Washington, D.C., Nov. 2-4 — Contact: Supergroup Association, 348 E. South Temple, Salt Lake City, Utah 84111.

Data Processing Management Association International Computer Conference and Business Exposition. San Francisco, Nov. 2-4 — Contact: DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

Electronic Imaging '87. Boston, Nov. 2-5 — Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Comdex/Fall '87. Las Vegas, Nov. 2-6 — Contact: Keith F. Westerman, The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Managing Change in Information Resources Management. Crystal City, Va., Nov. 3 — Contact: Cathy Hirsh, American Management Systems, Inc., 1777 N. Kent St., Arlington, Va. 22209.

The First International Videotex Forum. Paris, Nov. 3-4 — Contact: International Videotex Industry Association/AFTEL, 131, avenue de Wagram, 75847 Paris Cedex 17.

Information Systems Trainers Fall Conference and Trade Show. Denver, Nov. 5 — Contact: Ron Barela, 8878 South Allison St., Littleton, Colo. 80213.

Making Schools More Productive. Dallas, Nov. 5-7 — Contact: Institute for the Transfer of Technology to Education of the National School Boards Association, 1680 Duke St., Alexandria, Va. 22314.

Update '87 and 1987 Institute of Industrial Engineers Integrated Systems Conference. Nashville, Nov. 2-7 — Contact: Conference Department, IIE, 25 Technology Park/Atlanta, Norcross, Ga. 30092.

NOV. 8-14

1987 Fall Workshop and Computer Systems Demonstrations. Orlando, Fla., Nov. 8-11 — Contact: Management Systems Committee, American Trucking Associations, 2200 Mill Road, Alexandria, Va. 22314.

1987 International Hotel/Motel & Restaurant Show. New York, Nov. 8-11 — Contact: Howard Hamm, CEM, General Manager, George Little Management, Inc., Suite 1100, Two Park Ave., New York, N.Y. 10016.

Eighth Annual Data Training Conference and Exposition. Anaheim, Calif., Nov. 8-12 — Contact: Data Training Conference and Exposition, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

Current Trends and Future Directions in Hospital Information Systems. Chicago, Nov. 9-10 — Contact: Sheldon I. Dorenfest & Associates Ltd., Suite 510, 5 Revere Drive, Northbrook, Ill. 60062.

1987 National Conference on Software Testing. Orlando, Fla., Nov. 9-11 — Contact: Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

Chief aims higher

CONTINUED FROM PAGE 105

devotion to computing, Stadel has nonetheless built up a successful career since leaving Stanford in 1962.

Before she joined Addison-Wesley in 1986, she played a pivotal role in instituting General Electric Co.'s site licensing contracts with microcomputer software vendors. That project allowed her to use her management skills. "She handled the negotiations, I handled the technology end," says GE manager of product technology Jeffrey Ehrlich. "I picked the product, and she would pursue it."

Ehrlich says Stadel did a good job of selling the benefits of the concept inside GE. "That was the kind of thing that she really seemed to get into," he recalls.

In the same year, a headhunter contacted Stadel to ask her to refer a colleague for the top MIS job at Addison-Wesley. Instead of providing someone else's name, Stadel decided to check it out herself.

Personal interest involved

What initially caught Stadel's attention was Addison-Wesley's proximity to the Massachusetts shore. She is an avid sailor and has raced boats since she was a child in San Diego. She says her career moves had prevented her from pursuing the sport in recent years, and she wanted her next job to provide her with access to deep water for her 30-foot sailboat, an Ecthell 22.

But discussions with the Addison-Wesley management team suggested that more than the hobby would bring Stadel to the company.

The plans management laid out indicated that the firm wanted a new approach to computing. Stadel's mission would be to move away from the traditional, centralized approach and create an end user-oriented organization.

Bigger opportunity

Not only did the MIS post present a huge challenge, but Stadel also saw the environment at Addison-Wesley as one that could provide her with the bigger opportunity she wanted.

In the year since she joined the company, Stadel has found the job very demanding. But she feels she is making progress. What's more, she says, it is that progress that will eventually lead to her ultimate goal.

Webster, who has been with Addison-Wesley for 22 years, says Stadel has made progress in creating a more businesslike management team in MIS. "It is different now," he says. "She has made it more professional. Not that it wasn't before, but it was more relaxed and less formal."

Cleaning house

Before Stadel reaches her goal, there are more immediate concerns. "There are a number of applications here that are 10 to 15 years old," she says.

"The objective is to clean them up — some of them have just been patched and patched to the point where you can't patch them anymore — while also creating a service organization. I expect, for two or three years, to go after the big problems. Then I can move onto the more eloquent ones," she explains.

Currently, Stadel's department is finalizing a decision to move from an IBM VSE environment to the MVS operating system for its IBM 4381 mainframe. The system runs Cullinet Software, Inc.'s IDMS with a mix of in-house and packaged applications.

Challenges ahead

Meanwhile, she is structuring her group into a service organization. She is using information center concepts without information center-specific hardware and software, she says. The focus is on education; she would like to see end users become more self-sufficient.

Stadel views these challenges as a large-scale version of her earlier endeavors in MIS jobs at such places at Lockheed Missiles & Space Co. in Sunnyvale, Calif., Napa (Calif.) Community College, Stanford, San Jose State University, consulting firm McKinsey and Co. and GE.

"The problem-solving side has always been challenging, and as I moved up, I found that putting teams together to solve problems is really like a more complex programming problem," she says.

"I wouldn't say it has not been a frantic push to the top. I've taken cuts in pay to take new jobs. I made choices because I had a set of experiences and I wanted to broaden them."

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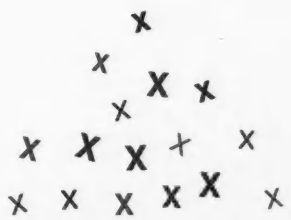

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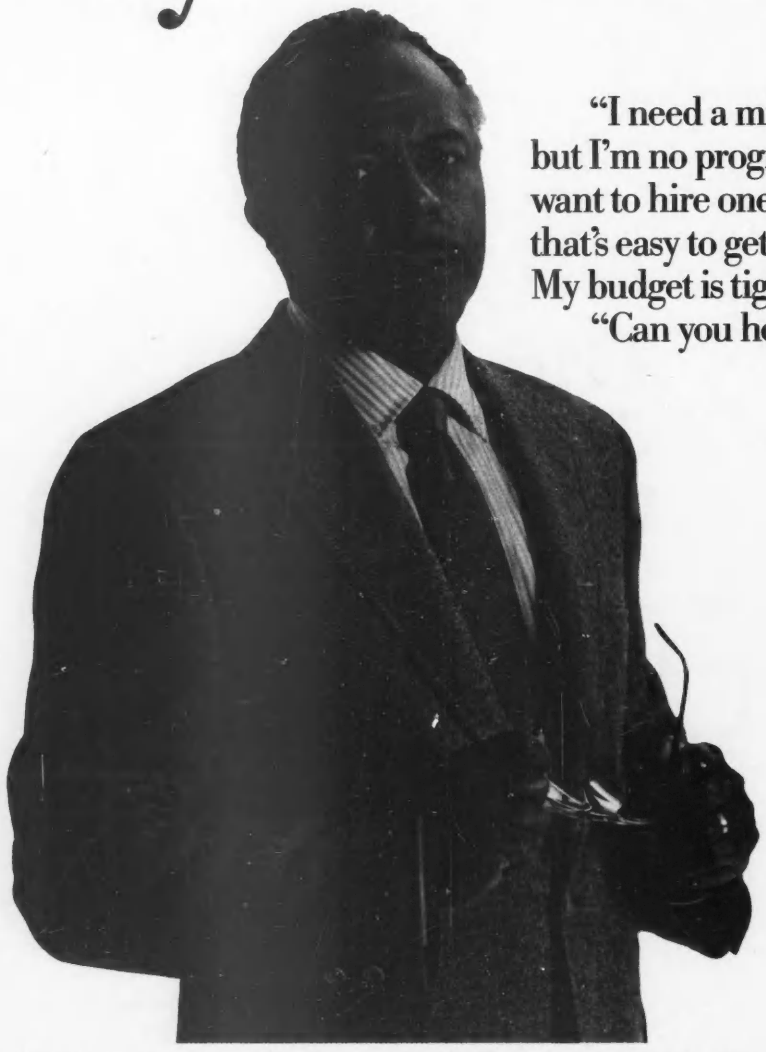

"I need a mid-size computer, but I'm no programmer and I don't want to hire one. I want software that's easy to get, install and learn. My budget is tight.
"Can you help me?"

Like the north and south poles, people who buy mid-range computers can be alike, yet opposite.

Their needs may be worlds apart, but each asks, "Can you help me?" And IBM answers, "Yes."

The fact is, IBM can help more kinds of customers, more ways, than anybody. We offer an extraordinary range of computing power, and all of it is available to any of our mid-range customers.

But there's one thing we don't have, and neither does anybody else: a "one-size-fits-all" design that can satisfy everyone without compromise. The needs of a small law firm, a retail chain and a multi-national corporation, for example, are too diverse for one architecture to serve each equally well.

So IBM offers a choice of mid-range systems, System/3X and System/370. Neither is "better" than the other, they're just better suited for different kinds of jobs. You may even want both.

And since we give you a choice, we'll help you make the right one. Together, we'll analyze your needs for software, connectivity and training. We'll look ahead to future growth, and we'll work to protect your previous investments.

We'll fit our system to your needs, not vice versa.

Power to start with, and grow with.

The System/3X family includes the System/36 and System/38.

The IBM System/36 is our most affordable and easiest-to-learn system. With over 4,000 programs available, it's ideal as a small company's first computer, with plenty of room for growth. It's also

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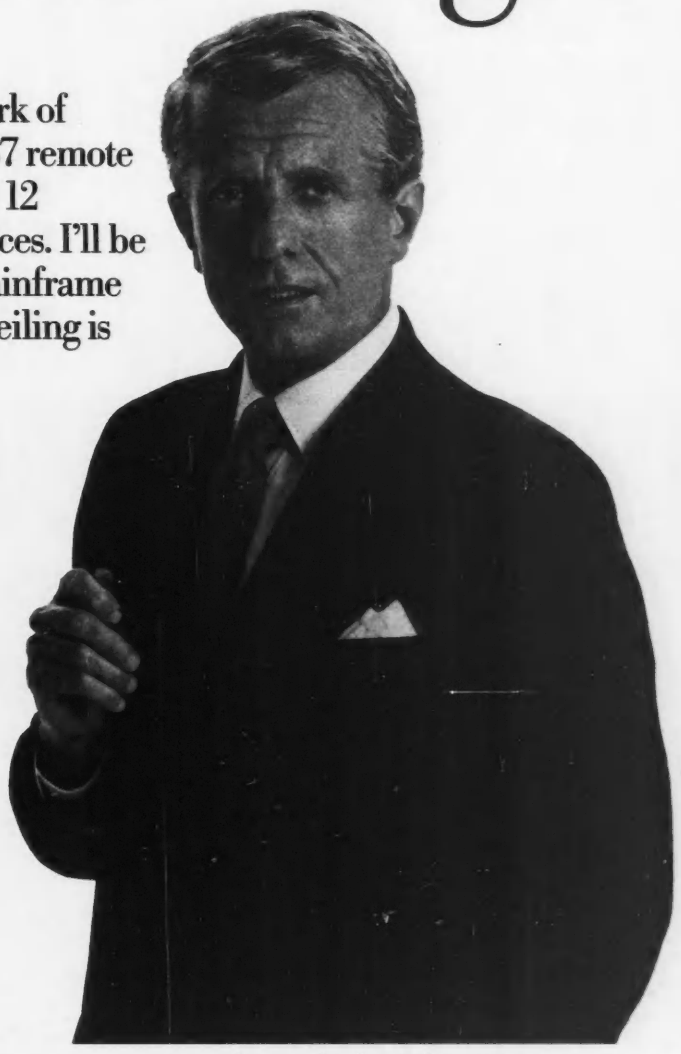
-range mid-range.

"I'm building a network of mid-range computers in 37 remote locations connecting with 12 mainframes in 5 other places. I'll be sending both data and mainframe applications. My growth ceiling is pretty much unlimited.

"Can you help me?"



extremely connectible. So a larger business can build a network of System/36s, or include them in existing networks with PCs and mainframes.

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Our System/370 architecture brings large system computing to mid-size environments with the IBM 9370 Information System and the newly updated IBM 4381 Processor family.

The 9370s are surprisingly compact, yet they not only connect with IBM's biggest mainframes and other systems (through a variety of networks), they can run thousands of mainframe programs.

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INDUSTRY INSIGHT

Clinton Wilder

Minisuper market shifts

Usually, what we would define as an industry trend is an evolutionary process — a gradual technology or market shift that develops over months or even years. Occasionally, however, evidence of such developments leaps out of the day-to-day industry news in a single morning.

On one day earlier this month, Alliant Computer Systems Corp. and Convex Computer Corp., the rival leaders of the rapidly emerging minisupercomputer market, both sent out warning signs. Both said their third-quarter earnings would be lower than expected, and both cited severe pressure on prices as a primary reason.

For Alliant, it was the second straight quarter that the Littleton, Mass., firm was forced to tell the financial community it would not meet earnings goals. The unforgiving denizens of Wall Street battered the stock as a result. In the third quarter (if anyone remembers market behavior before the Great Crash/Recovery of '87 last week), Alliant was among the 10 worst-performing stocks in the computer industry.

What's going on with the mini-suddenly-not-so-supers?

Using that old foolproof analysis method called 20-20 hindsight, the pattern in the minisuper market is a familiar one. It is the convergence of a number of maxims that have been seen in other segments:

- Hardware prices tend to fall.
- After the initial technology pioneering by a couple of companies, several new competitors, backed by venture capitalists seeing a "hot" new market, enter the fray.
- Most of the easy sales have already been made, meaning vendors have to pump more expenses into marketing, sales and third-party channels.
- Last but certainly not least, the market is chilled as loyal customers of the industry titans — Big Blue and You-Know-Who — try to anticipate those players' entries into the game.

"The key to this market's

Continued on page 116

Lotus, Microsoft pass $100M

Wang, Unisys, Prime strong; AT&T, STC, Apollo stall

BY STEPHEN JONES
CW STAFF

Microsoft Corp. and Lotus Development Corp. stayed neck-and-neck in the microcomputer software wars for the quarter reported last week, with each company posting quarterly revenue in excess of $100 million for the first time.

Most major industry vendors reported strong results for the quarter, even as many of their stock prices were plummeting (see story page 1).

Among the third-quarter winners were Wang Laboratories, Inc., Unisys Corp., Prime Computer, Inc. and Computer Associates International, Inc. Winners also included transaction processing systems rivals Tandem Computers, Inc. and Stratus Computer, Inc.

But AT&T, Apollo Computer, Inc. and Storage Technology Corp. reported fairly disappointing quarters.

Control Data Corp. reported its second profitable quarter of the year, earning $6.8 million, or 16 cents per share, on sales that rose less than 2% to $831.4 million. CDC had a one-time gain of $45.4 million from selling its stake in Commercial Credit Co., but that was mostly offset by a $36.5 million reserve for the cost of replacing faulty FSD II disk-drive components and an $8.4 million inventory write-down for Cyber 205 supercomputers.

By a nose

Microsoft's $102.6 million in sales edged out the $101.2 million tallied by Lotus. Both companies' revenues rose an identical 54% when compared with the same quarter a year ago.

While Wall Street analysts praised both companies for being the first microcomputer software houses to break the $100 million mark in a quarter, Lotus seemed to outshine Microsoft with a surprisingly strong performace.

"Lotus's quarter was awesome," said Bruce Johnston, an analyst with First Boston Corp. The Cambridge, Mass.-based company recorded a 101% increase in net income for the third quarter ended Oct. 3, from $9.5 million in 1986 to $19.1 million this quarter. Earnings per share doubled to 42 cents.

Rick Sherlund, vice-president of investment research at Goldman, Sachs & Co., attributed Lotus's record revenue to increased sales of 1-2-3, the company's best-selling spreadsheet program.

Sherlund estimated that 1-2-3 sales jumped 33% in the September quarter, from 180,000 units a year ago to about 238,000 copies this year.

PC surge helped

Analysts said Lotus's numbers were higher than expected because of a surge in the sales of IBM Personal Computers and compatible machines in the last six months.

Redmond, Wash.-based Microsoft reported numbers that had been expected by most observers for the first quarter of its 1988 fiscal year, which ended Sept 30.

Microsoft's net income rose

Continued on page 120

1987 third-quarter earnings

Industrywide growth remains strong, but AT&T continues to struggle

	Net income July-Sept. (millions of dollars)	Percent change from 1986	Revenue July-Sept. (millions of dollars)	Percent change from 1986
Apollo	$3.6[1]	+48	$135	+35
AT&T	$505	−5	$8.47B	+1
CIS[2]	$2.8	−7	$91.4	+38
Lotus	$19.1	+101	$101.2	+54
Microsoft	$21.3	+34	$102.6	+54
Prime	$15.9	+31	$236.2	+6
Storage Technology	$1.4	−85	$185.9	+4
Stratus	$5.3	+51	$48.8	+52
Tandem	$30.4	+41	$291.1	+32
Tandy	$69.1	+393	$1.42B	+13
TI	$64.2	+47	$838.2	+13
Ungermann-Bass, Inc.	$1.8	+50	$38.2	+28
Unisys[3]	$2.22B	—	$129.7	—
Wang[4]	$22.5	—	$693	+16

[1] Excludes $6.5 million one-time charge
[2] Quarter ended Aug. 31
[3] 1986 results did not include full ownership of Sperry Corp.
[4] Reported $30 million loss in 1986

CW CHART

IBM battles CDC, Cray in Korea

SEOUL, South Korea — IBM recently declared its intent to join Cray Research, Inc. and Control Data Corp. in a bid to become the first supercomputer supplier to South Korea.

The three companies are competing for a $30 million supercomputer procurement bid by the government-funded System Engineering Center (SEC) here. Before IBM entered the bidding, the industry's attention was focused primarily on the Cray X-MP and the CDC subsidiary ETA Systems, Inc. ETA-10 supercomputer.

Cray, confident of winning the bid with its X-MP supercomputer, secured a foothold in South Korea this summer by concluding a dealership contract with Eunsan Corp., a domestic trading firm. CDC, on the other hand, is challenging Cray with its 20 years of business experience here.

As CDC and Cray are facing off for the bid, IBM hopes to add fuel to the fire by offering its highest end mainframe, the 3090 Model 600. The computer features vectorizing capability by providing six vector processors.

According to an IBM executive, the 3090 Model 600 is comparable to parallel processing computers in terms of its pipeline processing, memory capaci-

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Inside

- Honeywell President James Renier adds CEO to his title. Page 116.
- Cadam, Adage, Adra Systems settle suits. Page 116.

NEC, Quantum suit settled for nearly $3M

BY JAMES A. MARTIN
CW STAFF

MILPITAS, Calif. — Quantum Corp. said last week it had reached a settlement totaling nearly $3 million with NEC Corp. and NEC Information Systems, Inc. as a result of a patent-infringement suit filed by Quantum against NEC in 1986.

The settlement follows a recent court order upholding Quantum's claim that NEC and NEC Information Systems infringed Quantum's wedge-servo hard disk drive architecture used in the flagship Hardcard product line of Quantum subsidiary Plus Development Corp.

"Our wedge-servo architecture has been the foundation for two generations of OEM drives," said Quantum Chairman and Chief Executive Officer Stephen M. Berkley in a prepared response.

"We believe this feature has been a major factor in our market success," Berkley added.

Under the settlement, NEC must pay Quantum $2.975 million for infringing that company's wedge-servo architecture in three NEC rigid disk drive models in both 5¼- and 3½-in. form factors.

Other company dismissed

Scotts Valley, Calif.-based Mountain Computer, Inc. was originally cited by Quantum as a co-defendant in the patent infringement suit against NEC, as Mountain was incorporating NEC's 3½-in. hard disk using the Quantum architecture in Mountain's Drive Card product [CW, Feb. 10, 1986].

However, Mountain was dismissed from the suit in the settlement.

Mountain's Drive Card is a hard-disk add-in card that also competes in certain markets with the Plus Development Hardcard.

In 1986, Quantum successfully sued Computer Memories, Inc. for a $6 million settlement, claiming Computer Memories had also infringed the wedge-servo patent.

Renier appointed Honeywell CEO

James J. Renier

MINNEAPOLIS — An expected management succession took place last week as Honeywell, Inc. President James J. Renier added the title of chief executive officer, which had been held by Chairman Edson W. Spencer for 13 years.

Spencer, 61, will remain chairman.

Renier, 57, a 31-year Honeywell veteran, was president of Honeywell's information systems unit from 1982 to 1986. In 1986, he became president and chief operating officer of the corporation, with Jerome Meyer taking over the top information systems post. Honeywell spun off most of its computer business earlier this year to Honeywell Bull, a joint venture with Compagnie des Machines Bull and NEC Corp.

Renier joined Honeywell in 1956 as a senior research scientist. He was named to head the company's systems and research center in 1965. He later held senior positions in Honeywell's aerospace and defense and controls systems arms.

Cadam, rivals reach $1M settlement

BY STANLEY GIBSON
CW STAFF

BURBANK, Calif. — Putting an end to a series of lawsuits in the computer-aided design software market, Cadam, Inc., Adage, Inc. and Adra Systems, Inc. announced a settlement last week in which the insurance carrier of Adage and Adra will pay over $1 million to Cadam.

"The insurance carrier made a business decision," said Brij Prasad, executive vice-president of Adage. Prasad explained that mounting legal fees incurred defending Adage and Adra may have prompted the settlement offer from the insurance carrier, The Chubb Group.

In addition, Adra and Adage will cease to market Cadra-I, a product that Cadam claimed unfairly copied the look and feel of Cadam software. Under the settlement, Billerica, Mass.-based Adage will sell off its inventory of the Cadstation 2/50 and the Cadra-I software that is sold with it. Adage and Adra will continue to fix bugs and maintain compatibility with future versions of Cadam software, the companies said.

Adra will continue to develop, market and distribute the Adra 1000 and Adra 3000 workstations with the Cadra-II software. William Mason, president and chief executive officer of Adra, said Cadra-II, a follow-on product to Cadra-I, is dissimilar to Cadam software in look and feel.

Cadam originally sued Adage and Adra in early 1986, alleging copyright infringement. In return, Adage and Adra sued Cadam, charging violation of antitrust laws.

With the settlement, all parties agreed to release each other from claims and counterclaims of the litigation.

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Minisuper

CONTINUED FROM PAGE 115

size and composition," Alex Brown & Sons analyst Joseph Payne wrote in a recent report on the technical computer systems industry, "will be determined more by the future actions of IBM and DEC than by the relatively small companies that are suppliers of this market today."

Where have we heard that before? The technical workstation market, to cite one prominent example. But before all the scientific computer company entrepreneurs start folding their tents, let us remember how Sun and Apollo were supposed to start cowering when IBM announced the RT Personal Computer. DEC's Microvax line has been a more serious threat, but Apollo and, especially, Sun are doing just fine, thank you.

The key to minisuper market success will be software. Alliant Chairman Ron Gruner says the company is redoubling its efforts to work with third-party applications developers in vertical markets such as geophysical exploration and chemical analysis; Convex claims to have some 150 application packages available for its C series machines.

But Payne estimates that as many as 1,000 DEC VAX scientific/engineering applications could be suitable to compete in this market, and the number will surely increase if the VAX line maintains anything like its current momentum. That has to worry Alliant and Convex.

The minisuper market is in a transition phase. We're going to see a lot of new systems in the next 12 months, some from new players like Cydrome (aligned with Prime) and Multiflow, and some priced very aggressively. The race is on; following the pattern in this business, the best technologists may fall behind the savviest strategists and marketeers.

Wilder is *Computerworld's* senior editor, computer industry.

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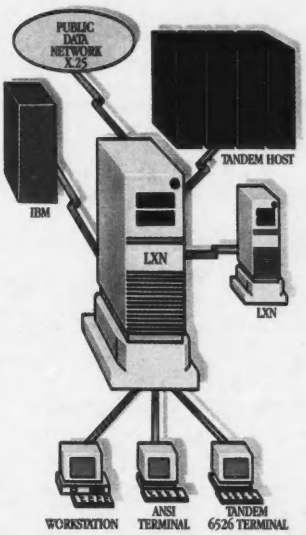

both Tandem host applications and UNIX applications, as well as other hosts through SNA or X.25. You can connect PCs to LXN through Ethernet LANs, then LXN to other systems. A MS-DOS file server provides availability benefits of LXN to PC users.

HIGH AVAILABILITY.

Tandem is the first to bring OLTP features to UNIX in this price range. The system can support two mirrored disks. If one fails, the other takes over. In case of power failure, an uninterruptible power supply will run the entire system for up to five minutes. It will also send everything in memory to disk. When power is restored, auto restart resumes where you left off, maintaining data integrity.

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Lotus, Microsoft

CONTINUED FROM PAGE 115

34% to $21.3 million, or 38 cents per share. The company claimed that recent incentive stock option plans cut net income by about $2 million, or 4 cents per share.

The cost to launch such products as Excel, Microsoft Word 4.0 and Works for the PC reduced Microsoft's net income as well, analysts said.

First Boston's Johnston said Microsoft apparently lost market share with some of its older application products, such as Multiplan, which reportedly had flat sales.

Growing gap

But the gap between Microsoft and Lotus is expected to expand as Microsoft's spate of recently released products starts to generate revenue this quarter. Sherlund predicted that Microsoft will have revenue in excess of $120 million for the December quarter, while Lotus will report between $105 million and $110 million.

Other companies that reported quarterly results last week included the following:

Wang. Wang continued to show signs of recovery, posting a profit of $22.5 million, or 14 cents per share, for its first fiscal quarter of 1988. For the same period last year, Wang had a net loss of $30 million, with per-share earnings 19 cents in the red.

Attributing revenue growth to increased shipments of its high-end VS 7000 series, the Lowell, Mass.-based systems manufacturer reported a 16% rise in revenue — from $598 million a year ago to $693 million this year.

"Wang is making a comeback," said David Wu, vice-president of research at S. G. Warburg & Co. in San Francisco. Wu said that internal restructuring and cost-cutting measures have helped the company revive its fiscal health.

While Wu predicted increased revenue for Wang in the next quarter, he said it is unclear whether the company will be able to gain enough of a competitive position in the systems market to make a full recovery.

Unisys. The second largest U.S. mainframe vendor rang up a 145% increase in net income for the third quarter ended Sept. 30 — from $52.9 million for the same period in 1986 to $129.7 million this year.

Earnings, which reflected a three-for-one stock split in July, rose 36% to 65 cents.

Revenue dropped from $2.42 billion for the third quarter in 1986 to $2.22 billion this year because the company has pulled out of a number of businesses since last year that no longer generated sales.

Unisys said international sales continued to be strong, while the U.S. computer market gained momentum.

Prime. The Natick, Mass., minicomputer maker recorded a 31% increase in net income to $15.9 million, or 32 cents a share, for the three months ended Sept. 28.

But some analysts were disappointed with Prime's 6% growth in revenue — from $221.9 million for the same period in 1986 to $236.2 million this year.

"They've done a great job of controlling expenses, but the key issue is that they are not growing their business," said Thomas Rooney, a computer analyst with Donaldson, Lufkin & Jenrette, Inc.

Rooney blamed the weak performance on what he characterized as Prime's limited minicomputer offerings in low-end markets and their lack of networking capabilities.

He said revenue will continue to be flat if Prime does not introduce low-end products that can generate new accounts and attract more end users.

AT&T. The telecommunications giant reported a drop in income and scant revenue growth for the three months ended Sept. 30.

The company said net income dropped from $533 million for the same quarter in 1986 to $505 million this year, while earnings per share declined 1 cent to 47 cents. Revenue increased from $8.427 billion for the year ago quarter to $8.474 billion.

AT&T said income was down when compared with the 1986 quarter because that period included a boost of $68 million, or 4 cents per share, in one-time gains.

'Not a barn-burner'

"It's not a barn-burner [quarter], but they showed very strong earnings across the board," said John Bain, a communications analyst with Shearson Lehman Brothers, Inc.

The company did not break out sales figures for its line of computers, but Bain speculated that AT&T will lose about $400 million in that segment for calendar 1987.

At a Geneva press conference, AT&T Chairman James Olson said that computer sales did grow, but he added that profits suffered from "fierce price competition in all markets."

Tandem. The Cupertino, Calif.-based firm passed the $1 billion milestone for its fiscal year ended Sept. 30 with a 35% growth in sales to $1.05 billion. Profits for the year rose 66% to $105.6 million, or $1.08 per share.

"They did not have to push very hard to get over the $1 billion barrier," said Hambrecht & Quist, Inc. analyst Jeff Canin, noting Tandem's consistent growth for the past two years.

He added that profit margins have remained strong despite an aggressive hiring plan.

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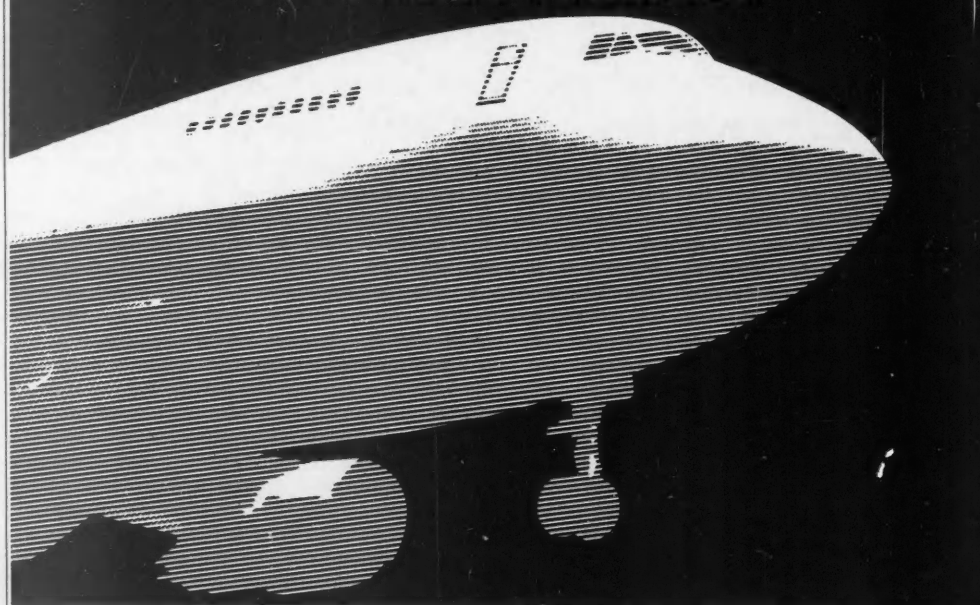

For the quarter, Tandem's earnings rose 41% to $30.4 million, or 31 cents per share. Revenue was $291.1 million, up 32% from the year-earlier quarter.

Stratus. The Marlboro, Mass.-based manufacturer of fault-tolerant computer systems saw sales grow by 52% to $48.8 million for the quarter. Earnings increased by 51% to $5.3 million, or 26 cents per share. Warburg's Wu said he was impressed with Stratus's performance, noting that sales of its XA 2000 product line were bolstered by the company's increased push in direct sales.

Apollo. Stung by a $6.5 million after-tax charge for unauthorized foreign currency transactions and a sticky product transition, Apollo reported a loss of $2.9 million, or 8 cents per share. Although operating profit rose 48% from year-earlier levels to $3.6 million, or 10 cents per share, it fell significantly from the second quarter when the firm earned 21 cents per share.

Robert Herwick of Hambrecht & Quist attributed the sequential profit drop to the cannibalization of Apollo's DN 3000 workstation sales by the new DN 4000, which began shipping during the quarter.

'Violated rule'

"The results proved you should always begin shipping a major new product at the beginning of the quarter," he said. "Apollo violated that rule, and they paid the price." But Herwick predicted a strong fourth quarter based on the DN 4000 ramp-up and traditional year-end customer buying.

Computer Associates. In its first quarterly results reflecting the acquisition of competitor Uccel Corp., Computer Associates reported profit growth of 162% on a 75% rise in revenue in its second fiscal quarter.

Earnings were $15.8 million, or 20 cents per share, up from $6.1 million, or 8 cents per share, a year earlier.

Revenue jumped to $168.3 million from $96.1 million. The year-earlier figures reflect the combined results of Computer Associates and Uccel.

"They are probably not discounting the competing products [with Uccel] as much as they did, and that may be responsible for at least some of the growth," said Paine Webber, Inc. analyst Bob Therrien. "But they appear to be strong across product and geographic lines. Computer Associates may be the only company with the technology and marketing wherewithal to bridge IBM's three operating systems so that their products at least look alike."

Texas Instruments, Inc. TI reported sales of $1.4 billion for the three months ended Sept. 30, a 13% increase over last year's third quarter. Profits rose from $36 million in 1986 to $73 million this year, while earnings per share increased from 14 to 79 cents.

In a letter to shareholders, President and Chief Executive Jerry Junkins said a substantial increase in semiconductor profitability was sparked by increased sales of application-specific integrated circuits.

The company's line of networked computer systems, data terminals and printers was described as achieving only "moderate levels" of profitability.

Tandy Corp. The micro vendor recorded a 13% increase in sales for the three months ended Sept. 30. Sales rose from $743 million in the same period last year to $838.2 million this year.

Profits jumped 47% to $64.3 million for the Fort Worth, Texas-based company. Analysts said increased microcomputer and cellular telephone sales helped boost Tandy's numbers.

Altos Computer Systems, Inc. The San Jose, Calif.-based supermicro maker recorded a 72% increase in income to $2.2 million for the first quarter of its 1988 fiscal year. Earnings per share rose from 10 cents for the year ago quarter to 17 cents this year. Sales increased 25% to $40.6 million.

Storage Technology. The Louisville, Colo., manufacturer of storage devices and subsystems recorded a large drop in net income for the third quarter ended Sept. 25. Income fell from $9.1 million for the same period in 1986 to $1.4 million this year. Earnings per share sunk from 4 cents to 1 cent for the quarter.

The company blamed the low figures on a number of contracts that were not paid off as expected during the quarter. Revenue, however, did increase from $178.5 million in the year-ago quarter to $185.9 million this year.

Continental Information Systems Corp. (CIS). The second-largest U.S. computer leasing firm reported a 7% drop in profits for the second quarter ended Aug. 31. Earnings were $2.8 million, or 19 cents per share, down from $3 million, or 20 cents per share, a year earlier. Revenue was up 38% to $91.4 million.

For the six-month period, CIS revenue withstood a $15 million decrease from year-earlier levels because of the loss of commissions on tax-advantage lease transactions that were negated by the Tax Reform Act of 1986. But a rise in the remarketing of used equipment helped offset that loss, according to CIS Chairman Harry Goetzmann. Six-month revenue was $174.5 million, compared with $132.8 million in 1986. The second quarter results did not reflect revenue from recently acquired CMI Corp.

MCI Communications Corp. MCI reported net income of $22 million, or 8 cents per share, on revenue of $994 million for the quarter ended Sept. 30. Revenue for the same period one year ago was $910 million with net income of $18 million, or 6 cents per share.

Senior Editor Clinton Wilder contributed to this story.

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Concurrent eyes South Korean mini market

Concurrent Computer Corp. is pushing for a joint venture agreement with Namyong Industrial Co., the trading arm of Namyong Nylon Group in Seoul, South Korea, in an effort to enter the growing South Korean minicomputer market and, especially, the National Administration Information Project.

According to Namyong sources, the new company, tentatively named Concurrent Korea, is slated for start-up at the beginning of 1988, with an initial investment of $1 million. Under terms of the agreement, Oceanport, N.J.-based Concurrent Computer will hold a 51% equity share in the joint venture and will take charge of the ownership of its South Korean offshoot.

Namyong, which has so far been a sales representative for Perkin-Elmer Corp., has sold more than 23 units of Perkin-Elmer's flagship multiprocessor MPS 3200 series in South Korea's domestic market since the beginning of last year. Once Perkin-Elmer spun off its minicomputer manufacturing arm as Concurrent, Namyong started sounding out the possibility of establishing a joint-venture company under a long-term plan to strengthen its presence here.

Although details of the venture were not disclosed, Concurrent Korea initially is expected to handle sales and maintenance of Perkin-Elmer systems.

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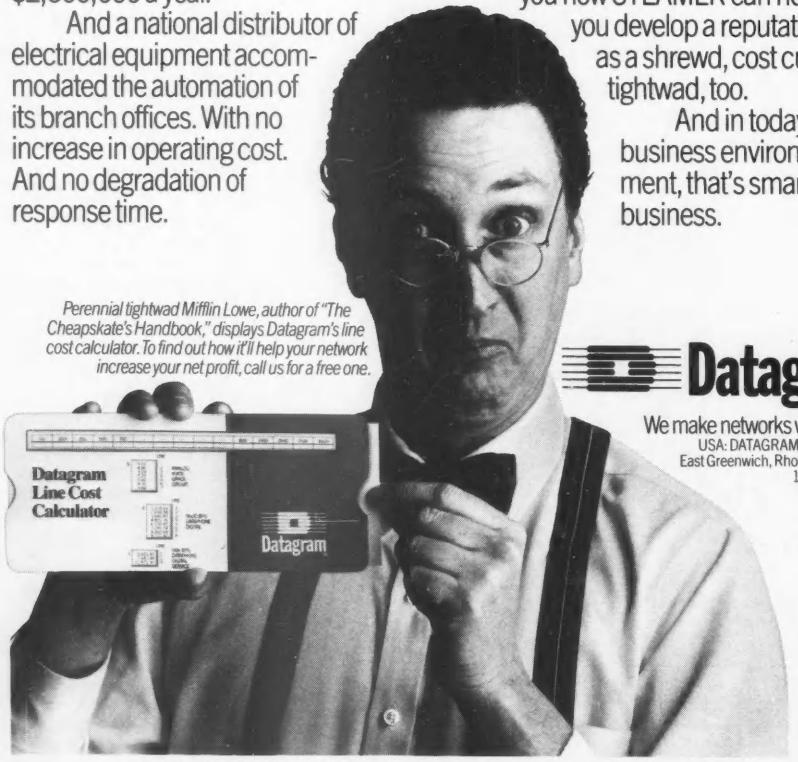

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IBM battles

CONTINUED FROM PAGE 115

ty and processing speed. The executive said that IBM intends to submit a letter of intent to sell supercomputers to South Korea's SEC by the end of this month.

Some analysts, however, have pointed out that the 3090 Model 600 is a large-scale computer — not a supercomputer — and, therefore, not eligible for the bid.

Other analysts said they believe that IBM's negotiating skills and dominant position in the local market could very well move the company from dark horse to winner.

The SEC reportedly will award the supercomputer contract by the end of next month. The supercomputer is slated to be installed in the SEC by next July.

The government is also considering a plan to allow the National Meteorological Observatory and South Korea's Energy Economics Institute to share the use of the system with the SEC.

MERGERS & ACQUISITIONS

The Meridian Group, which acquired Europe's **United Leasing PLC** this spring, has acquired another European equipment lessor, **IBL PLC** in Surrey, England, through a $48 million cash transaction.

With this latest acquisition, The Meridian Group's combined revenue exceeds $1 billion, with annual equipment transactions totaling $600 million. The acquisition makes Meridian the largest computer leasing group in Europe.

Anacomp, Inc. announced that **NCR Corp.** signed an agreement to acquire the printer group of **Datagraphix**, a division of Anacomp. The printer group, which reaped revenue of about $30 million in 1986, markets and services a line of high-speed nonimpact printers.

The acquisition is effective Nov. 2.

Datagraphix, based in San Diego, is a supplier of computer output micrographics equipment, such as microfilm and microfiche recording systems.

Datagraphix's printer unit, which has 112 employees, will be integrated into the customer services division of NCR's U.S. data processing group.

ITT and **Northern Telecom Ltd.** have announced the sale of ITT's 24% interest in UK-based **STC PLC** to Northern Telecom for approximately $730 million.

ITT has also agreed to repurchase the STC shares at the option of Northern Telecom if UK regulatory approval is not obtained prior to the end of next month.

STC is one of the leading manufacturers of telecommunications and business information systems equipment in the UK.

Bell Atlantic Corp. announced that it has acquired **Camex Industries, Inc.**, a privately held distributor of **Control Data Corp.** computer parts and supplies. Terms were not disclosed.

Camex, based in Camarillo, Calif., was founded in 1981 and has 30 employees. It is the largest independent supplier of CDC disk drive storage device parts and assemblies. Camex also supplies, repairs and refurbishes magnetic disk heads.

Fabricating salary doesn't pay

Employers, recruiters discourage falsifying earnings, education, skills

BY JANET MASON
SPECIAL TO CW

You are applying for a new MIS position that comes with a salary of $52,000 to $58,000. The only problem is that your current salary is only $42,000. Should you "elaborate" on your present salary in hopes of boosting your income?

The answer given by MIS recruitment specialists is a resounding "Don't do it." The employment specialists maintain that honesty is the best policy, citing stories about applicants who falsified their backgrounds and subsequently lost their job opportunities.

Fish stories

Despite the danger of being caught, some applicants persist in misrepresenting their backgrounds to employers. The percentage of candidates falsifying their past histories ranges from "a relatively small number" to as high as "one in 10," according to varying estimates by recruiters.

These falsifications range from little white lies boosting current salary by several thousand dollars to fibs covering up unexplained absences from employment. In some cases, candidates even go as far as lies about a college degree where there is none. In the MIS community, where everyone seems to know everyone else in the upper echelons, these rarely go undetected.

In addition to talking to other people in MIS, recruiters interview applicants at length to determine whether they are portraying their backgrounds accurately. After years of being in the business, recruiters develop a feel for whether a person is being honest. And since most reputable recruiters have some technical background, they can grill candidates in a technical interview to discern whether they are telling the truth about their skills.

The most flagrant abuse is falsifying current salary. Since many employers base starting salaries on an applicant's past income, candidates are often tempted to boost their earnings. Because the applicant's present employer rarely knows he is job hunting, recruitment agencies and companies seeking new employees usually do not check current salary.

But many candidates do not realize that the company will often check on their previous salaries immediately after they are hired, says Jack Talabisco, president of Botal Associates, Inc., a New York-based recruitment firm specializing in MIS positions. "If there is a major discrepancy, the employee will be fired," Talabisco says simply.

Candidates who feel they are underpaid and fear that their future salaries will be similarly below their expectations are especially prone to elaborating on their present pay rates.

> "YOU CAN'T EXPECT the new employer to pay for the sins of the past."
>
> DEAN BECKER
> SOURCE EDP

"You can't expect the new employer to pay for the sins of the past," says Dean Becker, managing director of the Philadelphia office of Source EDP.

Companies, however, do not always base a new employee's starting salary on his past income — especially if he can prove he is worth more.

"A good company is more likely to compare the candidate's skills and background to comparable positions in the firm and match salaries," Becker says.

Recruiters advise candidates to be honest about their present salaries and, if they are underpaid, to tell the prospective employer why they feel they deserve more money. They also counsel applicants to present themselves as forthrightly and knowledgeably as possible. Even if they have a low salary in their present position, they may start at the company mid-range rather than at the bottom, "especially if they can impress the technical people with their expertise," Talabisco says.

Many recruiters will advise candidates who have misrepresented themselves on the best ways to honestly portray their past histories. In some cases, the candidates do not intentionally misrepresent themselves. Sometimes a person expecting a salary increase may add the raise onto his base salary level, and others may add fringe benefits to their salaries. Recruiters advise these candidates to discuss these additions with prospective employers but not to include them in the salary level.

Between jobs

Besides salaries, some candidates will misrepresent time lapses between jobs. Applicants sometimes extend the dates from one job to another to cover up time spent job hunting. Sometimes they will omit short periods of employment to avoid presenting themselves as job hoppers.

"So many people who were laid off are afraid to admit it," says Claire Craney, a partner with Philadelphia-based Worico Computer Resources, Inc. Because of the increasing number of companies cutting back their MIS staffs, there is less of a stigma for candidates who were laid off.

Recruiters advise candidates to be honest with prospective employers about layoffs, and they should suggest that the interviewer speak to their past manager. This contact will assure the future employer that the person was not released because of performance or personality problems.

Absences from employment for extended periods of time do "raise eyebrows in the MIS field, where there is a high demand for employees," says Source EDP's Becker. But long lapses are more acceptable for candidates looking for management positions, because it takes managers longer to find work.

Even with all the checking that employers do, some employees' falsified backgrounds still go undetected. But the employees must live with the risk that the lies will be exposed. "Eventually, whatever they lied about will come out — usually when they have a job they really want," Talabisco says.

Mason is a Philadelphia-based freelance journalist.

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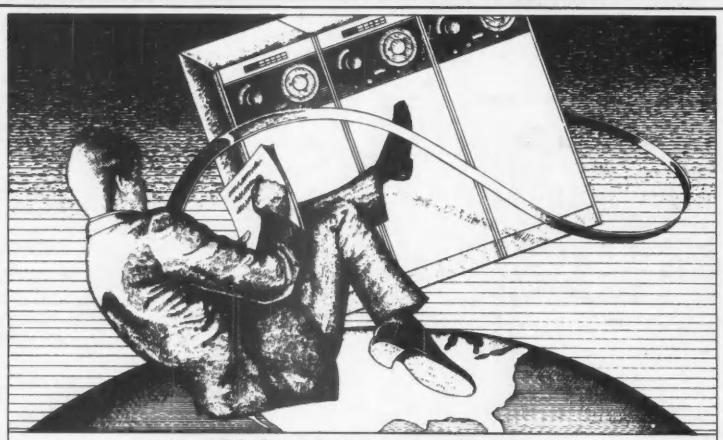

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With 3-5 year experience selling solutions and software services in the DEC, DG or HP market. Experience selling 4GL/DBMS software or development tools; and background in major account management are pluses. Travel.

Software Specialists
(All locations)

Sales support positions require experience—in applications development or VAX/VMS, DG/MV or HP3000 systems. PowerHouse or 4th generation language a plus. Excellent presentation and communications skills required. Travel.

Applications Specialists
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Minimum of 2 years PowerHouse of 4GL application development or design experience on either DEC/VAX or HP3000 series computers required. Travel.

Federal Region Manager
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Responsibility includes setting up a Federal Region office to focus on Federal business opportunities. Experience with government contracting, GSA schedule preparation, and the development and execution of business and marketing plans essential. A very high level position reporting directly to Cognos U.S. President.

Sales Programs Manager
(Boston)

Direct sales experience in computer software or services required, as is marketing background and/or Corporate staff experience. Will design and implement nationwide sales programs for launching new products or focusing on specific markets.

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High visibility position, representing Cognos products at national trade shows and symposiums. Must have in-depth technical knowledge of the DP business industry, HP or VAX environment and 4GL's. Ability to make stand-up presentations to large groups required. Nationwide travel.

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Heavy recruiting experience in high tech software environment required. Will concentrate on sales and software engineers; and develop employee relations programs and manage internal posting program. Travel required.

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(New York City)

Experience in penetrating and managing large accounts in the New York area is required. Also background in marketing software—DBMS or applications—to VAX, DG or HP users. Disciplined sales techniques and a successful track record also essential.

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- Positions require UNIX* background. UNIX* V internals would be a plus. Must also have experience in compiler development, compiler support or software product porting in the UNIX* V environment. Also requires software quality assurance experience for UNIX* based software products.
- Positions require 2-3 years RPG experience for System 34/36. UNIX* experience and other languages considered a plus.

UNIX* (Operating Systems)

Positions require strong background in UNIX* operating systems, and "C" language is necessary. Product development experience is desirable. UNIX* internals experience is also helpful.

UNIX* (Data Communications)

Positions require background in UNIX* and "C" and a knowledge of device drivers. Must have experience in one or more of the following areas: async/sync host communications (e.g. IBM, Sperry, Burroughs); LAN's, Wide Area Networks (PDN/ DDN) including protocols such as TP-4, TCP/IP, or ISO/OSI standards.

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Positions require 1 to 3 years experience with Relational Database management software running under the UNIX* operating system (e.g. Oracle, Ingres, Unify, or Informex).

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Senior and intermediate programmers are required for challenging positions in the implementation and productization of secure UNIX* systems. Working knowledge of UNIX* internals and the DoD "Orange Book" Trusted Computing Base (TCB) is required. Implementation experience with a secure operating system is highly desirable.

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Positions require BS/MS Computer Science or equivalent education, training and/or experience for communications and network software/ microcode development on DCP/Telcon system. Languages include assembler and PASCAL on DCP and/or 68000 microprocessor. Experience with TCP/IP protocols and LAN interface desirable.

For consideration, send your resume in confidence, indicating your area of interest to: **UNISYS Corporation, Attn: Ms. Lynne Tibolla, Employment Dept. 1a, Bldg. C, 322 North 2200 West, Salt Lake City, Utah 84116.**

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Contact Joan Anderton or Dave Woolsey at (503) 626-5700 or speak with Joan at Booth #344, at the UNIX Expo, October 27, 28 and 29 in New York City.

If you can't attend, send your resume to SEQUENT COMPUTER SYSTEMS, INC., 15450 S.W. Koll Parkway, Beaverton, OR 97006-6063. An equal opportunity employer, m/f/h/v.

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WASHINGTON, D.C.: 3110 Fairview Park Drive, Suite 1040, Falls Church, VA 22042, (703) 876-5100

CHICAGO: 2600 South River Road, Suite 304, Des Plaines, IL 60018, (312) 827-4433

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714, (714) 261-1230

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SCHOOL DISTRICT OF KANSAS CITY, MISSOURI

Data Processing Director

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BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, Al DeMille, Regional Manager, Nancy Percival, Account Executive; 800-343-6474. (in Massachusetts, 617-879-0700).

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652; Warren Kolber, Regional Manager, 201-967-1350; Jay Novack, Account Executive 800-343-6474.

WASHINGTON, D.C.: 3110 Fairview Park Drive, Ste 1040, Falls Church, VA 22042; Katie Kress, Regional Manager, 703-876-5100; Pauline Smith, Account Executive 800-343-6474.

CHICAGO: 2600 South River Road, Ste. 304, DesPlaines, IL 60018; Patricia Powers, Regional Manager, 312-827-4433; Ellen Cross, Account Exective 800-343-6474.

LOS ANGELES: 18004 Sky Park Circle, Ste. 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-827-0164; Ellen Casey, Account Executive, 800-343-6474.

SAN FRANCISCO: 18004 Sky Park Circle, Ste. 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-827-0164; Chris Glenn, Account Executive, 800-343-6474.

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COMPUTER TECHNOLOGIES FACULTY POSITION

Purdue University School of Engineering and Technology at Indianapolis. An opening in the Computer Technology Department at Indiana University-Purdue University at Indianapolis (IUPUI) is available August, 1988. Applicants must have some background in IBM hardware and systems analysis and design. Some knowledge of personal computers would be helpful. Business or industrial experience, teaching experience, and a minimum of a master's degree are required. Rank and salary dependent on qualifications. Please send resume by December 31, 1987 to: Professor Robert G. Crozier, Chairman, Search and Screen Committee, Indiana University-Purdue University at Indianapolis, P.O. Box 647, 1201 East 38th Street, Indianapolis, Indiana 46223.

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Bachelor's degree in a related field and experience in programming or related data processing field. Knowledge of COBOL and Management Information Systems. Application deadline November 12, 1987. Reply to:

EL PASO COMMUNITY COLLEGE
PERSONNEL DEPARTMENT
PO BOX 20500
EL PASO, TX 79998

EEO/AA

MIS DIRECTOR

($34,233-$46,844) Columbia, MO. BS in Computer Science, Business Administration or related area. Prefer advanced Business Management degree. Ideal candidate would also have minimum four years increasingly responsible senior level management experience in mid-sized central data processing organization. (IBM 4300 Series or System 38 experience a plus) Department Head position with responsibility for Joint Communications System. Apply in confidence by December 18, 1987 to:

Personnel Director
City of Columbia
PO Box N
Columbia, MO 65205

Deadline subject to extension to obtain qualified applicants.

EOE M/F/H/V

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Will develop, coordinate, and implement network management systems using NETVIEW and NETVIEW/PC interface. Five years systems programming/applications experience with SNA, VTAM/NCP, NETVIEW and one year experience with microcomputer hardware/software.

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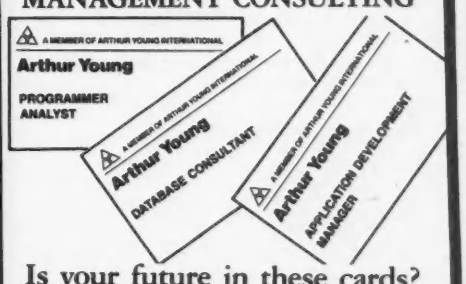

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You choose the region. You can advertise nationally in any one newspaper at regular rates, or any combination of publications at special rates. Or you can choose to concentrate in one or more of three regions — East, Midwest and West. You automatically get a three-newspaper buy, *Computerworld, InfoWorld* and *Network World. Then you can add on one or more other publications. For example, if you are in the Boston area, you might want to add the Boston edition of Computer Currents.* Or if you are looking for a VAX programmer in the Midwest, you may want to add Digital News Midwest edition.

You don't have to pay for readers you don't want. When you advertise in the Sunday paper, most of the people you are reaching have nothing to do with computers. But you have to pay for them anyway, since rates are based on total circulation. The Computer Careers Network rates are also based on total circulation, but all of that circulation and readership are computer or communications-involved professionals.

You can reach professionals who aren't actively looking. Our research indicates that roughly 10% of computer professionals may be actively looking for a job at any given time. The other 90% will not be reading the Sunday classifieds. But more than half of computer professionals would consider other job options at any given time if they became aware of them, and those are the hidden stars that you can reach in the pages of their professional newspapers — the ones they read for the information they need to stay ahead.

Circulation plus projected pass-along audience

	EAST	MIDWEST	WEST	TOTAL U.S.
Computerworld	293,032	229,907	127,135	650,074
InfoWorld	171,784	113,414	134,802	420,000
Network World	108,542	62,221	49,237	220,000
Subtotal	**573,358**	**405,542**	**311,174**	**1,290,074**
Digital News	106,468	52,252	53,280	212,000
Federal Computer Week	74,412	20,883	25,083	120,378
Computer Currents				
Northern California Edition			225,000	225,000
Southern California Edition			234,000	234,000
Boston Edition	120,000		120,000	
Total	**874,238**	**478,677**	**848,537**	**2,201,452**

Computerworld, a weekly newspaper with a total audited reach of more than 650,000 (U.S.) computer-oriented professionals, carries more recruitment advertising than any other specialized business publication. Every week, it delivers the latest news to information systems executives and specialists at medium to large organizations, as well as the executives at the computer industry vendor organizations that serve them. Its readers include MIS directors and managers, systems analysts, programmers, sales and marketing professionals and other computer-involved executives.

InfoWorld is the weekly newspaper edited for personal computer professionals at organizations using multiple systems. It has a total audience (subscribers and pass-along readers) of 420,000, including PC managers, software developers and other PC-oriented professionals.

Network World is the news and features weekly for larger users of communications and networking. Its 220,000 readers (including subscribers and pass-along readers) include voice and data communications managers and specialists as well as communications consultants.

Digital News is a biweekly newspaper for computer professionals who work with the VAX line of computers from Digital Equipment Corporation. Total readership, including subscribers and pass-along readers, is over 210,000, including computer executives and managers, systems analysts, programmers, engineering executives and staff, and other VAX-oriented computer professionals.

Federal Computer Week is edited for information systems executives and staff who work in and sell to the federal government. Its weekly circulation includes MIS executives and managers, as well as systems analysts, programmers, software developers, communications specialists and other information systems professionals. Total readership (including paid and pass-along) exceeds 120,000.

Computer Currents is a group of regional publications edited to meet the needs of business and professional users of personal computers in the region covered.

Computer Currents/Northern California Edition is published biweekly and has a total circulation of 75,000. Total readership exceeds 225,000.

Computer Currents/Southern California Edition is published monthly and has a total circulation of 78,000, with a total readership of 234,000.

Computer Currents/Boston Edition covers the entire eastern Massachusetts and southern New Hampshire area with a monthly circulation of 40,000 and total readership of 120,000.

Special low introductory offer — $8.00 per line!

Regional Buys

Here's how to place your recruitment advertising regionally:

The basic recruitment "package" automatically delivers your advertisement in three leading computer newspapers — *Computerworld, InfoWorld,* and *Network World* — AND in the region of your choice. Whether you choose the East, West, or Midwest, you pay just **$8.00 per line.** And if you want, you can add a second region to your three-book buy for a total cost of **$15.00 per line.**

This basic package includes three of the eight newspapers available to you through the IDG Communications Computer Careers Network. You can also schedule *Digital News, Federal Computer Week* and *Computer Currents* (Northern California, Southern California, or Boston edition) — to help you reach all the right people in all the right places.

Regional Combination Buys

	1 REGION	2 REGIONS
Computerworld InfoWorld Network World	$ 8.00	$15.00
PLUS		
1 addition	$10.00	$17.00
2 additions	$12.00	$19.00
3 additions	$14.00	$21.00
4 additions	$15.00	$22.00
5 additions	$16.00	$23.00

Please note: This special introductory offer is valid only through December 31, 1987. Individual contract rates do not apply, and no lower rate is available.

National Buys

And here's how you can buy nationally to get the maximum reach possible:

Sometimes you need national exposure for your recruitment advertising. That's when you can put these advertising opportunities to work for you.

Combination buys. These special combination buys allow you to recruit computer professionals nationally using the combination of newspapers that's right for you.

Choose from: *Computerworld, InfoWorld, Network World, Digital News,* or *Federal Computer Week.*

National Combination Buys

	RATES PER LINE[1, 2]
Combination of 2	$15.00
Combination of 3	$17.00
Combination of 4	$19.00
Combination of 5	$20.00

1) *Computerworld* contract advertisers — Determine your discounted line rate, by deducting the difference between *Computerworld's* open line rate and your current contract rate from the above combination rates.

Example:

$12.60 open line rate
− 11.35 contract rate
$ 1.25 difference

Your discounted rate of a combination of two publications would be $15.00 − $1.25 = $13.75.

2) If your combination buy does not include *Computerworld*, your Computer Careers national rate may be lower. To calculate, start by adding the stand-alone rates of the respective publications (*InfoWorld* — $9.29, *Network World* — $5.00, *Digital News* — $5.00, *Federal Computer Week* — $3.60). Then deduct 10% from the total.

Example:

$ 9.29 InfoWorld
+ 5.00 Network World
$14.29 Total
− 1.43 less 10%
$12.86 discounted rate

To put the IDG Communications Computer Careers Network to work for you, call the sales office nearest you — or contact John Corrigan, Recruitment Advertising Sales Director, at 617-879-0700. Just one quick phone call can give you all the information you need on running your recruitment advertising — regionally or nationally — in up to eight leading industry newspapers.

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Position yourself at the leading edge of the UNIX* System challenge.

Now is the time to apply your talents to a stimulating new career challenge at AT&T. The home of the UNIX* Operating System, and manager of the world's largest and most important telecommunications network.

We are looking for experienced data processing professionals to help extend UNIX* Distributed Processing and telecommunications to marketing and service management. The expansion will be rapid and create new environments for career growth within our Information Management Business Customer Systems Organization. Providing on-going challenges and creating many opportunities far into the future.

We now have literally scores of openings, at many professional levels, based in New Jersey. Salaries range from the mid 20's to high 30's—plus possible bonus incentives based on individual performance and team awards based on company profitability.

Just fill in the following checklist profile so you can quickly and easily tell us your areas of expertise. We will promptly inform you of job matches now—or in the months ahead. Qualified candidates will be required to pass a proficiency test, and interview with our Technical Managers. If successful, applicants with excellent written/verbal communications skills will receive job offers with flexible starting dates.

The completed profile with your resume could put you on an exciting and rewarding career path into the future of telecommunications. We regret we cannot accept phone calls or pay agency fees. Mail resume to: **Technical Recruitment, Ref. CW1029, Room C330/E93, 412 Mt. Kemble Ave., Morristown, NJ 07960.**

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I have ___ years experience with UNIX* Operating System
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I have ___ years in MIS applications
I have ___ years experience in telecommunications software ☐ hardware ☐
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computers

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Current or previous experience with MICS as the MICS Systems Administrator or a heavy use of MICS, strong OS/JCL, and above average oral communication skills. Strong troubleshooting/debugging skills and SAS experience is a plus.

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Engineering Consultants for Chicago and Columbus requires:

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  - *Call processing software design and development
  - *Switching system requirements and architecture
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  - *Operating systems development, and local area networks

Business Systems Consultants for Columbus and Dayton requires:

- (3-5) years minimum working experience in any of the following areas:
  - *IDMS, IMS DB/DC, ADSO, CICS
  - *ROSCOE, DATATRIEVE, VSAM, VTAM, OS JCL
  - *COBOL, PL/1, ASSEMBLER, FORTRAN
  - *MANTIS, NATURAL, IDEAL, ADABAS
  - *VAX/VMS, DOS/VSE, VM, MVS
  - *NCR environments

OUR SUCCESS IS OUR PEOPLE!

Please submit your resume to:

Robert D. Williams
Technical Resources Manager
Advanced Programming Resolutions, Inc.
2715 Tuller Parkway Drive
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MSU System Services, Inc., the service company subsidiary of the Middle South Utilities System, is seeking candidates to be part of a special projects team for production operations in a state-of-the-art environment. We currently are operating four IBM 3090s under OS/MVS/XA.

We currently have an opening in our Production Support section. This staff level position is assigned to technical projects in support of our operation. This individual will interface with other professionals in our technical services and applications programming departments to develop production procedures and standards as well as production job streams. Additionally, this individual is involved in project development relating to automated scheduling, disaster recovery, and quality/productivity reporting.

Requirements include thorough knowledge of OS/JCL, TSO, and the concepts and facilities of the MVS operating system. Experience in change management and control, along with good presentation skills, is a plus. Familiarity with SAS and EASYTRIEVE, along with knowledge of UCC 7 and 11, is preferred.

MSU System Services, Inc. offers a competitive compensation and benefits package, with relocation assistance available. Please forward your resume with salary information to: **MSU System Services, Inc., P.O. Box 61000, New Orleans, LA 70161, Attention: Marjorie Frederic, or call**

1-800-231-4481
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We have immediate opportunities for experienced systems professionals within our Customer Services Division. Openings are available throughout the country and offer extensive involvement on major accounts, as well as travel opportunity. All positions require a BSCS or equivalent background and excellent communications skills.

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You will be a key technical resource to both customers and our front-line sales teams on all matters regarding the installation of NCR's healthcare systems. Ideal candidates will have substantial DP experience in the healthcare/hospital industry. Will also consider RNs or LPNs with a PC background.

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You will apply your knowledge of communications, including SNA/X.25, to coordinate the installation of state-of-the-art communications network management software. Requires experience with IBM mainframes and related OS software within a Banking or Financial Services environment.

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Human Resource Dept.
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Competitive benefits package including relocation assistance.

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Tri-State Generation & Transmission Association, Inc.
Dept. 0129
P.O. Box 33695
12076 Grant St.
Denver, CO 80233

EOE/M/F/H/V

SENIOR ANALYST (IBM COBOL)

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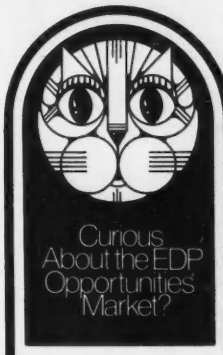

If you want to achieve computer career growth you must first learn what exceptional opportunities are available to you. NCA can provide you with completely detailed information on each position that interests you. Only then can you select the opportunity that is best for your career advancement.

Satisfy your curiosity today. Come in. Call. Or mail your resume to the NCA firm nearest to you.

ATLANTA: DataPro Personnel Consultants
400 Perimeter Center Terrace, Suite 650
Atlanta, GA 30346 (404) 392-4242

BALTIMORE: CIPS Inc.
1107 Kenilworth Drive, Suite 206
Towson, MD 21204 (301) 296-8420

BOSTON: Robert Kleven & Co., Inc.
P.O. Box 636
Lexington, MA 02173 (617) 861-1020

CHICAGO: Thomas Hirtz & Associates
150 North Wacker Drive, Suite 1700
Chicago, IL 60606 (312) 977-1556

CINCINNATI: Task Group
7675 Reading Road
Cincinnati, OH 45237 (513) 821-8275

CLEVELAND: Innovative Resources, Inc.
Trailer Office Tower, Suite 428
East 12th & Euclid
Cleveland, OH 44115 (216) 621-4220

COLUMBUS: Michael Thomas, Inc.
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Worthington, OH 43085 (614) 846-0926

DALLAS: DataPro Personnel Consultants, Inc.
12720 Hillcrest, Suite 520
Dallas, TX 75230 (214) 661-8600

DENVER: Abacus Consultants, Inc.
1777 South Harrison Street, Suite 404
Denver, CO 80210 (303) 759-5084

DETROIT: Electronic Systems Personnel
3000 Town Center, Suite 2580
Southfield, MI 48075 (313) 353-5580

GREENSBORO: DataMasters
P.O. Box 14548
Greensboro, NC 27415-4548
(919) 273-1491

HARTFORD: Compass Incorporated
900 Asylum Avenue
Hartford, CT 06105 (203) 549-4240

HOUSTON: Career Consultants, Inc.
1990 Post Oak Boulevard, Suite 1050
Houston, TX 77056 (713) 626-4100

INDIANAPOLIS: The Consulting Forum, Inc.
P.O. Box 68878
Indianapolis, IN 46268 (317) 846-6630

KANSAS CITY: DP Career Associates
8405 Metcalf, Suite 502
Shawnee Mission, KS 66212 (913) 236-8288

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SAN FRANCISCO: The Computer Resources Group Inc.,
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San Francisco, CA 94111 (415) 398-3535

SEATTLE: Hoover, Martin, Morris & Assoc.
1040 116th Avenue NE, Box C-90015
Bellevue, WA 98004 (206) 453-2700

SYRACUSE: CPA Associates Personnel Inc.
5790 Widewaters Parkway
Dewitt, NY 13214 (315) 446-8492

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The candidate must have a Bachelor's Degree plus a minimum of 4 years related experience in a manufacturing environment. The successful candidate will be able to identify information needs, establish strategies and projects for conversion to new environments, create data definitions, arbitrate and resolve divisional data issues, perform feasibility studies, and integrate and monitor the sources and uses of Manufacturing's data resource. Will actively participate in the development and maintenance of information models, management review and approval of projects, and the design of databases by development support groups.

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Nat'l. Big "8" consulting firm seeks indiv. w/strong cas.-prop. bkgrd. to help build consulting practice. Must have a strong DP bkgrd., excellent proj. mgmt. skills, prof. image, & be highly motivated. Location is open. Two positions available. Salary $65-$100,000+.

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Responsible for the planning, network design, analysis, product evaluation and implementation coordination of communications solutions on a city-wide basis. Provides technical and end user training and support. Considerable knowledge of voice and data communications equipment/systems and facilities is desired. Excellent interpersonal and communications skills are essential. A four year degree in CIS or Business Administration and one year experience is required. Salary: $27,498 to $36,814.

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Responsible for the development and revision of on-line application system programs using COBOL. Experience with Relational Data Base Management Systems, Data General AOS/VS, ICOBOL and INFOS is preferred. A two year degree in CIS or Computer Programming and one year experience is required. Salary: $23,698 to $31,747.

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PDP 11

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The prime responsibility for this individual will be to assume the leadership role in the design of complex applications. Using our structured methodology, you will produce data flow diagrams and structure charts. Subsequently, you will coordinate the development and testing of the application systems.

Applicants should have a college degree plus 5 years experience in development of applications, including at least 2 years systems design in a structured environment, 2 years 'C' programming experience, and exposure to distributed processing, preferably using Local Area Networks.

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Suitably qualified senior engineers are required to install and support our Kingdom-wide data communications network, consisting of IBM PS2 workstations, Racal-Milgo communications equipment and Ungermann-Bass Local Area Network equipment.

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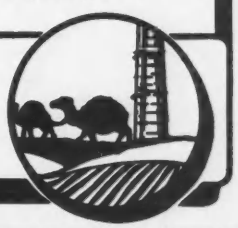

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QUALIFICATIONS: Demonstrated working knowledge of information systems and extensive experience with computers and data communications systems, preferably in an academic setting. Strong administrative skills and demonstrated ability to manage an office with various positions and responsibilities. Excellent interpersonal skills. Advanced degree in appropriate field.

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Candidates will be screened beginning November 1, 1987. The target date for filling the position is January 1988; however, the search will remain open until the position is filled.

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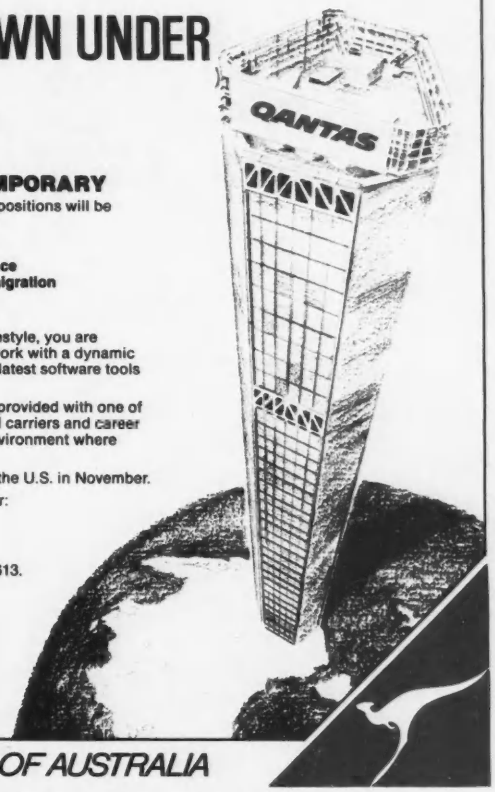

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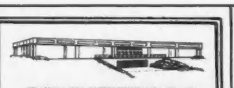

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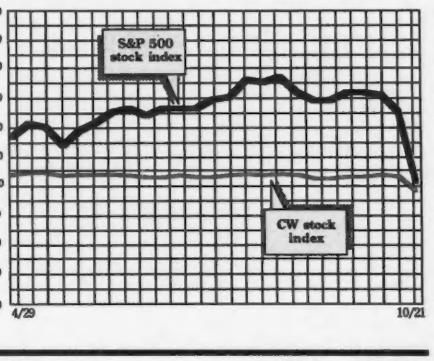


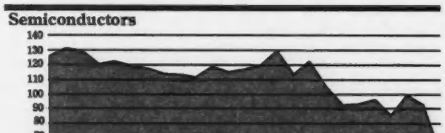
Indexes	*Last Week*	*This Week*
Communications	108.3	**85.8**
Computer Systems	125.5	**88.7**
Software & DP Services	137.5	**101.5**
Semiconductors	92.8	**60.3**
Peripherals & Subsystems	107.9	**77.5**
Leasing Companies	121.2	**93.8**
Composite Index	102.9	**98.3**
S&P 500 Index	125.1	**101.8**

Communications

Computer Systems

Software and DP Services

Semiconductors



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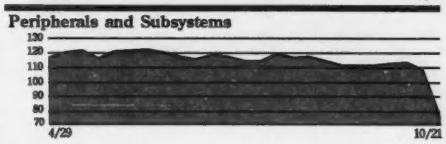

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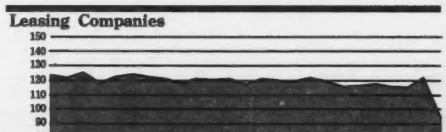


CW CHARTS: AMY J. SWANSON

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 21, 1987

EXCH		52-WEEK RANGE (1)		CLOSE OCT. 21 1987	WEEK NET CHNGE	WEEK PCT CHNGE
	Communications and Network Services					
N	AMERICAN INFO TECHS CORP	100	74	87.00	-10.38	-10.65
Q	ANDREW CORP	19	12	12.25	-2.75	-18.33
Q	ARTEL COMM CORP	5	2	1.88	-0.63	-25.00
N	AT&T	36	20	28.75	-4.00	-12.21
Q	AVANT GARDE COMP INC	6	3	3.00	-1.50	-33.33
Q	AVANTEK INC	19	9	9.63	-3.00	-23.76
N	AYDIN CORP	38	21	23.38	-7.13	-23.36
N	BELL ATLANTIC CORP	80	61	72.88	-4.88	-6.27
N	BELLSOUTH CORP	44	29	38.50	-2.50	-6.10
Q	FIBRONICS INT	28	16	18.00	-6.25	-25.77
Q	COMPRESSION LABS INC	8	4	4.38	-1.63	-27.08
O	COMPUTER NETWORK TECH	6	3	2.63	-1.19	-31.16
O	CONTEL CORP	40	25	30.25	-5.50	-15.38
Q	DATA SWITCH CORP	9	4	5.25	-3.00	-36.36
Q	DIGITAL COMM ASSOC	49	24	28.00	-11.75	-29.56
Q	DYNATECH CORP	44	22	22.00	-6.00	-21.43
Q	EQUATORIAL COMM CO	5	2	2.88	-0.38	-11.54
Q	GANDALF TECHNOLOGIES	11	5	5.88	-1.81	-23.58
Q	GENERAL DATACOMM INDS	14	4	5.38	-1.38	-20.37
N	GTE CORP	45	29	36.63	-6.00	-14.08
Q	INFOTRON SYS CORP	12	6	7.00	-2.00	-22.22
N	ITT CORP	66	45	51.88	-12.63	-19.57
N	M A COM INC	16	9	9.13	-3.63	-28.43
Q	MCI COMMUNICATIONS CORP	12	5	9.00	-1.88	-17.24
Q	MICOM SYS INC	18	8	8.63	-2.50	-22.47
Q	NETWORK SYS CORP	19	8	8.63	-2.88	-25.00
N	NORTHERN TELECOM LTD	24	14	16.13	-3.25	-16.77
Q	NOVELL INC	30	10	19.00	-8.00	-29.63
N	NYNEX CORP	78	13	70.50	-5.25	-6.93
N	PACIFIC TELESIS GROUP	34	9	30.00	-2.25	-6.98
N	PARADYNE CORP	9	4	4.63	-1.38	-22.92
A	PENRIL CORP	6	2	2.25	-1.75	-43.75
N	PLESSEY PLC	41	24	29.38	-4.63	-13.60
N	SCIENTIFIC ATLANTA INC	20	9	10.63	-3.88	-26.72
N	SOUTHWESTERN BELL CORP	46	22	38.88	-4.38	-10.12
Q	3 COM CORP	26	11	16.38	-6.50	-28.42
N	TIMEPLEX INC	41	18	22.88	-6.50	-22.13
Q	UNGERMANN BASS INC	16	7	7.25	-1.88	-20.55
N	U S WEST INC	60	43	52.00	-6.25	-10.73
	Computer Systems					
Q	ALLIANT COMPUTER SYS	37	5	7.25	-2.25	-23.68
Q	ALPHA MICROSYSTEMS	6	3	3.38	-1.63	-32.50
Q	ALTOS COMPUTER SYS	17	9	10.13	-4.50	-30.77
A	AMDAHL CORP	50	21	31.00	-14.88	-32.43
Q	APOLLO COMPUTER INC	25	11	11.50	-6.13	-34.75
N	APPLE COMPUTER INC	60	16	36.75	-16.50	-30.99
N	BOLT BERANEK & NEWMAN	30	12	16.50	-5.25	-24.14
Q	BRITTON LEE INC	5	2	2.38	-1.13	-32.14
N	COMPAQ COMPUTER CORP	79	15	52.00	-18.25	-25.96
Q	COMPUTER AUTOMATION INC	17	3	7.38	-5.88	-44.34
A	COMPUTER CONSOLES INC	12	2	3.63	-1.13	-23.68
Q	CONCURRENT COMP CORP	24	13	15.75	-3.25	-17.11
N	CONTROL DATA CORP DEL	38	21	23.50	-11.25	-32.37
Q	CONVERGENT TECH	12	4	4.25	-1.63	-27.66
Q	CONVEX COMPUTER CORP	22	8	8.25	-1.75	-17.50
N	CRAY RESH INC	136	47	60.00	-30.75	-33.88
Q	DAISY SYS CORP	13	6	6.25	-2.25	-26.47
N	DATA GEN CORP	39	16	20.88	-12.00	-36.50
N	DATAPOINT CORP	9	4	5.13	-3.25	-38.81
N	DIGITAL EQUIP CORP	200	4	133.50	-50.25	-27.35
N	FLOATING POINT SYS INC	17	4	5.00	-3.25	-39.39
N	GOULD INC	34	8	13.00	-9.13	-41.24
N	HARRIS CORP	43	24	25.75	-12.63	-32.90
N	HEWLETT PACKARD CO	74	38	45.38	-20.50	-31.12
N	HONEYWELL INC	91	49	61.75	-15.25	-19.81
N	IBM	176	102	120.00	-25.25	-17.38
Q	INFORMATION INTL INC	17	12	11.50	-1.75	-13.21
Q	IPL SYS INC	3	2	2.25	-0.63	-21.74
Q	MASS COMPUTER CORP	14	6	7.88	-4.25	-35.05
N	MATSUSHITA ELEC INDL LTD	196	93	142.00	-46.75	-24.77
Q	MEGADATA CORP	7	2	3.50	-1.13	-24.32
Q	MENTOR GRAPHICS CORP	39	15	20.25	-13.88	-40.66
N	NBI INC	14	4	5.00	-3.38	-40.30
N	NCR CORP	87	44	60.75	-15.75	-20.59
N	PRIME COMPUTER INC	31	12	14.63	-7.75	-34.64
Q	PYRAMID TECHNOLOGY	12	4	7.50	-3.00	-28.57
Q	STRATUS COMPUTER	41	19	21.25	-11.75	-35.61
Q	SUN MICROSYSTEMS INC	46	14	33.50	-8.00	-19.28
Q	SYMBOLICS INC	6	2	2.00	-1.00	-33.33
N	TANDEM COMPUTERS INC	38	17	23.88	-9.00	-27.38
N	TANDY CORP	57	31	38.50	-12.13	-23.95
N	ULTIMATE CORP	37	14	21.63	-10.50	-32.68
N	UNISYS CORP	48	24	29.88	-13.25	-30.72
A	WANG LABS INC	19	10	13.25	-4.88	-26.90
	Software & DP Services					
Q	ADVANCED COMP TECH	6	3	4.25	-1.38	-24.44
N	ADVANCED SYS INC	35	14	24.00	-9.50	-28.36
N	AGS COMPUTERS INC	30	10	16.25	-5.88	-26.55
Q	AMERICAN MGMT SYS INC	20	8	13.00	-4.88	-27.27
Q	AMERICAN SOFTWARE INC	22	8	8.75	-4.75	-35.19
N	ANACOMP INC	11	3	5.75	-3.88	-40.26
Q	ANALYSTS INTL CORP	10	4	6.25	-2.88	-31.51
Q	ASHTON TATE	33	18	19.00	-10.75	-36.13
Q	ASK COMPUTER SYS INC	17	8	7.88	-4.38	-35.71
Q	AUTODESK INC	34	11	20.00	-9.75	-32.77
N	AUTO DATA PROCESSING	55	16	37.25	-7.63	-16.99
Q	BOOLE & BABBAGE INC	12	6	7.25	-2.50	-25.64
N	COMPUTER ASSOC INTL INC	37	13	22.88	-10.63	-31.72
Q	COMPUTER HORIZONS CORP	15	8	9.75	-2.38	-19.59
N	COMPUTER SCIENCES CORP	73	36	48.50	-14.75	-23.32
N	COMPUTER TASK GROUP INC	18	11	12.00	-2.25	-15.79
Q	COMSHARE INC	28	11	15.50	-7.50	-32.61
N	CULLINET SOFTWARE INC	14	5	7.25	-4.88	-40.21
Q	CYCARE SYS INC	10	7	6.75	-1.88	-21.74
Q	DUQUESNE SYS INC	33	11	12.75	-4.00	-23.88
Q	ENDATA INC	16	6	9.50	-5.13	-35.04
N	GENERAL MTRS (CLS E)	51	24	36.25	-9.00	-19.89
Q	HOGAN SYS INC	17	5	5.38	-3.75	-41.10
Q	INFORMIX CORP	31	9	19.00	-7.75	-28.97
Q	INTELLICORP INC	11	3	4.25	-1.13	-20.93
Q	KEANE INC	10	5	6.25	-1.75	-21.88
Q	LOTUS DEV CORP	40	15	26.25	-9.75	-27.08
Q	MANAGEMENT SCI AMER	21	10	10.13	-2.75	-21.36
Q	MICRO PRO INTL CORP	8	2	4.44	-1.44	-24.46
Q	MICROSOFT CORP	79	18	53.26	-18.00	-25.26
Q	NATIONAL DATA CORP	34	19	24.25	-1.50	-5.83
Q	ON LINE SOFTWARE INTL INC	22	7	13.13	-4.50	-25.53
Q	ORACLE SYS CORP	38	9	24.00	-8.75	-26.72
N	PANSOPHIC SYS INC	28	12	16.50	-7.25	-30.53
Q	POLICY MGMT SYS CORP	30	18	18.50	-8.25	-30.84
Q	PROGRAMMING & SYS INC	14	8	9.50	-3.00	-24.00
Q	REYNOLDS & REYNOLDS CO	39	21	21.75	-4.25	-16.35
Q	SEI CORP	18	9	14.00	-2.00	-12.50
Q	SHARED MED SYS CORP	53	21	23.50	-1.75	-6.93
Q	SOFTWARE AG SYSTEMS INC	19	10	10.00	-3.00	-23.08
Q	SOFTWARE PUBG CORP	17	6	7.00	-3.00	-30.00
A	STERLING SOFTWARE INC	16	7	8.25	-1.63	-16.46
Q	SUNGARD DATA SYS INC	21	12	13.00	-4.75	-26.76
Q	SYSTEMATICS INC	30	15	20.75	-6.50	-23.85
N	SYS. SOFT INC.	24	10	11	-7.75	-40.79
N	URS CORP	23	12	13.13	-4.63	-26.06
Q	VM SOFTWARE INC	45	9	9.63	-4.38	-31.25
	Semiconductors					
N	ADV MICRO DEVICES INC	25	10	12.00	-8.00	-40.00
N	ANALOG DEVICES INC	24	11	11.50	-6.00	-34.29
Q	ANALOGIC CORP	13	7	7.50	-1.63	-17.81
Q	INTEL CORP	63	19	35.00	-21.50	-38.05
Q	LSI LOGIC CORP	17	8	8.88	-4.25	-32.36
N	MOTOROLA INC	74	34	43.75	-22.13	-33.59
N	NATL SEMICONDUCTOR	22	9	12.38	-7.38	-37.34
N	TEXAS INSTRS INC	80	36	39.75	-33.75	-45.92
A	WESTERN DIGITAL CORP	33	14	15.50	-9.25	-37.37
	Peripherals					
Q	ALLOY COMP.	12.75	4.5	7	-2.50	-26.32
N	AM INTL INC	9	3	4.50	-2.50	-35.71
Q	AST RESH INC	23	9	10.00	-6.38	-38.93
Q	AUTO TROL TECH CORP	9	3	3.88	-2.00	-34.04
Q	BANCTEC INC	16	7	7.25	-5.25	-42.00
Q	CIPHER DATA PRODS INC	18	5	6.00	-3.13	-34.25
A	COGNITRONICS CORP	5	2	2.75	-1.38	-33.33
N	COMPUGRAPHIC CORP	28	19	24.00	-2.75	-10.28
N	COMPUTERVISION CORP	23	9	10.38	-4.25	-29.06
A	DATAPRODUCTS CORP	24	7	7.75	-3.13	-28.74
A	DATARAM CORP	9	6	7.00	-0.63	-8.20
N	DECISION INDS CORP	13	5	5.88	-4.13	-41.25
N	EASTMAN KODAK CO	71	38	56.25	-9.08	-13.89
Q	E M C CORP MASS	29	10	15.75	-7.25	-31.52
Q	EMULEX CORP	10	4	5.38	-1.75	-24.56
Q	EVANS & SUTHERLAND	40	20	19.75	-6.50	-24.76
Q	ICOT CORP	13	5	5.63	-1.50	-21.05
Q	INTERLEAF INC	24	9	13.75	-5.25	-27.63
Q	IOMEGA CORP	8	2	1.88	-0.63	-25.00
Q	LEE DATA CORP	10	3	3.63	-0.88	-19.44
Q	MASSTOR SYS CORP	6	1	1.94	-1.19	-37.98
Q	MAXTOR CORP	34	8	9.00	-3.88	-30.10
Q	MICROPOLIS CORP	44	17	20.25	-12.75	-38.64
Q	MINISCRIBE CORP	18	7	7.63	-5.50	-41.90
N	MINNESOTA MNG & MFG CO	84	46	60.50	-12.00	-16.55
a	MSI DATA CORP	24	11	15.63	-4.38	-21.88
Q	PRIAM CORP	6	2	1.88	-1.13	-37.50
Q	PRINTRONIX INC	13	9	9.38	-1.63	-14.77
N	QMS INC	27	12	16.13	-7.00	-30.27
Q	QUANTUM CORP	35	10	10.50	-4.75	-31.15
Q	RAMTEK CORP	6	4	3.63	-2.00	-35.56
N	RECOGNITION EQUIP INC	27	7	8.63	-3.38	-28.13
Q	REXON INC	14	5	5.75	-1.25	-17.86
Q	SCAN TRON CORP	17	7	9.00	-1.50	-14.29
Q	SEAGATE TECHNOLOGY	46	11	13.50	-6.25	-31.65
N	STORAGE TECH CORP	5	1	1.75	-1.00	-36.36
Q	TANDON CORP	7	2	2.38	-1.38	-36.67
A	TEC INC	7	3	3.88	-1.06	-21.53
N	TEKTRONIX INC	43	29	30.00	-4.38	-12.73
Q	TELEVIDEO SYS INC	3	2	1.88	-0.63	-25.00
N	TELEX CORP	102	30	47.13	-19.88	-29.66
Q	WYSE TECH	40	11	25.63	-9.88	-27.82
N	XEROX CORP	65	50	55.63	-18.75	-25.21
Q	XIDEX CORP	16	8	9.00	-2.50	-21.74
	Leasing Companies					
Q	CAPITAL ASSOCIATES INTERNATIONAL INC.	11	4	5.25	-2.00	-25.00
N	COMDISCO INC	37	12	16.63	-14.75	-47.01
N	CONTINENTAL INFO SYS	14	6	7.38	-1.50	-16.90
Q	PHOENIX AMERN INC	8	3	3.00	-1.63	-35.14
Q	SELECTERM INC	7	4	4.25	-0.63	-12.82
N	U S LEASING INTL	67	42	66.50	-0.63	-0.93

EXCH: N—NEW YORK; A—AMERICAN; Q—NATIONAL; O—OVER-THE-COUNTER; S—SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Meltdown

Norsk Data, DG, Intel, Apollo among Black Monday victims

Although blue chips like IBM and Digital Equipment Corp. made the headlines (see stories on pages 1, 144 and 145), last week's stock market collapse hit the computer industry on all fronts.

Perhaps the biggest loser was Norway's Norsk Data AS, which lost a staggering 55% of its value in four days, diving 18¾ points (14 on Monday) to 15¼. Others that lost more than 30% included Data General Corp., off 10⅛ points to 20⅞; Intel Corp., down 16 points to 36; Apollo Computer, Inc., down 5½ points to 11½; and AST Research, Inc., off 5⅜ points to 10.

A host of stocks fell between 24% and 30%. Apple Computer, Inc. fell 11½ points to 36¾; Amdahl Corp. plunged 12½ points to 31; Cullinet Software, Inc. sank 3⅜ points to 7¼; Ashton-Tate Corp. fell 7 points to 19; and Control Data Corp. slid 10⅝ points to 23½. Curiously, Lotus Development Corp. soared to a new high of 39¾ during Thursday's session but closed at 26¼, down 6 points for the four days. Microsoft Corp. fell 11¼ points to 53¼. Compaq Computer Corp. closed Thursday at 52, down 10¼ points for the four days.

CLINTON WILDER

Printers feel desktop ripple

Seeing a lucrative opportunity in the desktop publishing market, printer manufacturers are planning to roll out their wares next week. A slew of 6 and 8 page/min laser printers is scheduled to be announced at Comdex/Fall '87 by such vendors as Ricoh Corp., Personal Computer Products, Inc. and Star Micronics America, Inc.

Although company spokesmen have claimed unique features for each of their products, highlighted capabilities read like a standard checklist: expanded memories, 300 dot/in. resolution and emulation of the Hewlett-Packard Co. Laserjet Plus.

Debut slew

Among the debuts expected are the following:

• Personal Computer Products' Laserimage 1000, priced at $2,495, is a 6 page/min laser printer featuring 31 standard fonts; RS-232, Centronics Data Computer Corp. and RS-422 interfaces; and emulations of such products as Laserjet Plus, HP Laserjet Series II, IBM Proprinter, Diablo Systems, Inc. Diablo 630 and Epson America, Inc. FX/80. Resolution is 300 dot/in., and a standard memory of 1M byte is expandable to 2M bytes.

• Olympia U.S.A., Inc. is planning to announce the Laserstar 6, a 6 page/min desktop printer. Olympia's offering features 1.5M bytes of memory, 300 dot/in. resolution and 15 internal fonts. It also provides emulation of the Diablo 630 and the Laserjet Plus and has built-in parallel Centronics and serial RS-232C interfaces. The Laserstar 6 costs $2,399.

• A 6 page/min printer called the PC Laser 6000 is expected from Ricoh. It features a graphics command set allowing downloading of up to 99 images, graphics, logos and text selections for printing in 300 dot/in. resolution. Support is provided for up to 32 fonts per page. Emulation of the Diablo 630 is standard, and optional emulation cards are available for the Laserjet Plus. Standard interfaces are Centronics parallel and RS-232C serial. The PC Laser 6000 costs $2,395.

• Blaser Industries, Inc. said it will introduce the Blaserstar 2, an 8 page/min printer featuring a 1M-byte standard memory and 300 dot/in. resolution. Emulations include the Laserjet Series II, Laserjet Plus, Diablo 630 and Epson FX-80. According to the vendor, the memory can be expanded to 4M bytes, and up to 128 fonts can be held ready at one time. The Blaserstar 2 costs $2,195.

• Star Micronics said it plans to introduce the Star Laserprinter 8, an 8 page/min printer priced at $2,699. It offers 1M byte of random-access memory and full-page bit-mapped text.

Printers other than lasers being shown include Star Micronics' seven-color dot matrix NX-1000 Rainbow, priced at $379, which features 144 char./sec. printing capabilities, and Olympia U.S.A.'s $499 dot matrix NP 80S and $649 NP 136S.

Publishing addenda

Not all of the desktop publishing products being announced at Comdex/Fall '87 are printers. Peripherals, including controllers, image grabbers, monitors and some desktop presentation devices, are also slated to debut.

• A hand-held video camera called the Frame Grabber is scheduled to be announced by Advanced Transducer Devices, Inc. Consisting of a video card, a camera, software and a cable, it plugs into a video adapter card in an IBM Personal System/2 and is said to allow users to combine text and graphics instantaneously. It costs $595.

• Personal Computer Products, Inc. is planning to announce an emulation of the Adobe Systems, Inc. Postscript page-description language called Imagescript as well as a personal computer-based laser printer controller, available with Imagescript for about $2,000.

• The TI-34010 Graphic & Imaging Family is scheduled to be announced by Imagraph Corp. It is an IBM Personal Computer AT-based dual-display function and single-monitor display controller. Said to functionally replace the standard IBM Monochrome Display Adapter and Hercules Computer Technology, Inc. display adapter as the main display board, it also provides a high-resolution mode for specialized graphics and imaging applications. Resolutions range from 1,600 by 1,200 or 1,280 by 1,024 to 1,024 by 1,024 pixels, and prices start at $1,295.

• Eastman Kodak Co. is slated to show six still-video products including still-video recorders priced from $1,900, a color video printer for $4,800 and a still-video transceiver for $12,6000.

LAN, links readied for rollout

Local-area network (LAN) products for IBM Personal Computers and Personal System/2s as well as products for linking microcomputers to mainframes are set to be announced at Comdex/Fall '87.

Rabbit Software Corp. said it will introduce end user-oriented products for the first time, including a PS/2 Micro Channel board that supports the firm's existing Rabbitstation Coax functions such as IBM 3270 device emulation, IBM 3278 and 3279 coaxial access and multiple file-transfer options.

In addition, a software upgrade called the Rabbitstation Distributed Function Terminal (DFT), which is said to support up to five sessions on a single coaxial controller, is being readied for release. Rabbitstation Coax costs $1,095, and Rabbitstation DFT costs $1,295.

Rabbit Software said it also plans to unveil Rabbitcluster, a 3270 coaxial controller and 3270 ASCII converter board set priced at about $2,000.

Zukerlan, a bidirectional parallel port controller that allows data to be transferred between IBM PCs and PS/2s reportedly will be unveiled by Advanced Transducer Devices, Inc.

Barr Systems, Inc. said it plans to introduce its Barr/SNA RJE micro-to-mainframe software that transforms PCs, PC XTs, ATs or PS/2 Models 25 and 30 into intelligent RJE workstations. The system can transfer information at speeds up to 65K bit/sec., the vendor said. A complete package costs $1,590.

Kea Systems Ltd. will reportedly announce its ZSTEMPC-VT240 and Powerstation 240 emulation products for connecting XTs, ATs and PS/2s to Digital Equipment Corp. PDP-11 and VAX computers. The ZSTEMPC-VT240 costs $295. The Powerstation 240 costs $435.

White Crane Systems, Inc. is enhancing its data-transfer utility, The Brooklyn Bridge, to include a universal cable that the vendor said will allow it to be used with laptops, desktops and the PS/2. The package costs $129.95.

Electronic Information Technology, Inc. said it plans to announce Mite-Email, a communications software package designed to allow the vendor's EIT PC-Fax facsimile product to access telex and electronic mail stations, on-line information services and public-domain bulletin boards. The EIT PC-Fax costs $1,095. Optional optical character recognition software costs $595.

Intel 386 still a popular companion

Variety of intros based on chip; flood of low-cost 286 systems also arrive

A variety of products based on the Intel Corp. 80386 microprocessor are slated to be announced at Comdex/Fall '87, along with another tide of low-cost Intel 80286 systems.

Rexon Business Machines Corp., a division of Rexon, Inc., is scheduled to unveil its 386-based Summit 2000 multiuser business system. According to the vendor, the Summit 2000 is capable of supporting up to 32 concurrent users running such multiuser operating systems as Santa Cruz Operation's Xenix System V and Xenix 386 and Pick Systems' Pick Open Architecture.

The Summit 2000 reportedly operates at 16 MHz with zero-wait states. The standard configuration features a dedicated 32-bit memory bus, Microsoft Corp. MS-DOS 3.2, a 1.2M-byte floppy disk drive, a 50M-byte Winchester disk drive, 1M byte of main memory and one 8-bit and five 16-bit expansion slots.

Low end not left out

Rexon is also expected to show its entry-level Summit 1000 and high-end Summit 4000, based on a 16-MHz 80386 with up to 16M bytes of memory and 1G byte of on-line hard-disk storage.

The Rexon Summit line is priced from $3,000 for the basic Summit 1000 to $60,000 for the Summit 4000.

Kimtron Corp. is scheduled to demonstrate the MOS3X, a 386-based system that is said to allow up to eight users to share an IBM Personal Computer XT or AT. The vendor said it can also attach to a Digital Equipment Corp.-compatible minicomputer. Pricing starts at $799.

Fortron Corp. reportedly will show both the 16- and 20-MHz versions of its Fortron 386 line of 80386-based personal computers designed for value-added resellers and dealers.

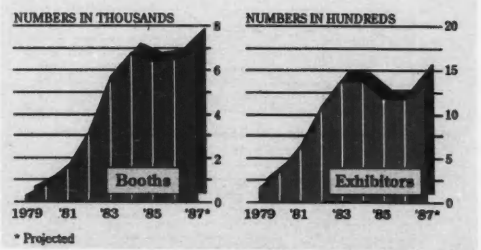
Pricing for the basic 16-MHz system, including 2M bytes of memory, one parallel port and two serial ports as well as Intel 80287 and 80387 sockets and a power supply, starts at $2,150, the vendor said.

Unix-based systems are also slated to debut, including the Kowin Computer Corp. Kowin Three, a 32-bit system said to support 32 workstations.

The Kowin Three was built around the Motorola, Inc. 68020 32-bit processor running at 20 MHz. It features an internal 40M-byte hard disk, expandable to 1G byte, and costs about $1,900 per user.

Spreading out

This year's Comdex/Fall is expected to exceed the exhibit size experienced in the boom of 1984



INFORMATION PROVIDED BY THE INTERFACE GROUP, INC.
CW CHART

Samna, Fox in software limelight

Software slated to be introduced at Comdex/Fall '87 includes Samna Corp.'s Samna Plus IV Version 1.1, a program said to integrate word processing with desktop publishing features, spreadsheet capabilities and the Samna Wordbase Manager for the Unix operating system. Prices range from $745 to $11,900.

Fox Software, Inc. is set to announce a version of Foxbase+, its interactive compiler for Ashton-Tate Corp.'s Dbase language, for the Apple Computer, Inc. Macintosh environment. According to a company spokesman, the product, called Foxbase+/Mac, allows users to automatically compile and run Dbase programs that have been moved from a Microsoft Corp. MS-DOS environment to the Macintosh.

It supports Macintosh features such as multiple output windows, multiple fonts in windows, multiple colors and a mouse interface. Foxbase+/Mac costs $395.

Product barrage

Other product announcements expected at the show include the following:

- Unimod, a three-dimensional surface modeling and machining program for personal computer users, which will be added to Encode, Inc.'s Encographics computer-aided design and manufacturing product family. Unimod costs from $5,000 to $8,000.
- Manusoft Corp.'s Fetch. The company's $99.95 Lotus Development Corp. add-on is designed to import and export data from data base and application programs into Lotus 1-2-3.
- Windjammer Software, Inc.'s Nexview, a 1-2-3 add-on designed to permit access to and manipulation of 1-2-3 and other spreadsheet data without programming. Nexview costs $599.
- Information Research Corp.'s enhanced Actiontracker project-management software, which includes a graphic interface, enhanced softing and editing capabilities and on-line Help screens. Actiontracker costs from $198 to $1,495.
- Computer Applications Research and Development, Inc.'s retail store management package, called POS+, which integrates point-of-sale, inventory and other applications for the IBM Personal Computer. The package costs $995.

Apple, Lotus back at Comdex

Return to show after lengthy absence to turn heat up on competitors

Apple Computer, Inc. and Lotus Development Corp. have loaded their surfboards and are heading to the desert to catch the wave. For them, at least, the Comdex hiatus is over.

Apple decided to return to Comdex this year, as did Lotus and several other companies.

Some of the reasons seem obvious. Apple must clearly be present to help keep the heat on IBM while trying to generate more interest in its Macintosh in corporate America.

And with the recent introduction of the Hypercard, Apple will likely use the mammoth trade show as an opportunity to fully explain the product to customers.

Developing relationships

"What we want to do is show we're very interested in developing relationships with value-added resellers and dealers," said Rick Myllenbeck, an Apple spokesman.

Lotus is making a return appearance to the fall show after a three-year absence. Lotus Chairman Jim Manzi is scheduled to present the Comdex keynote address.

Carrie Snyder, group manager of corporate programs at Lotus, said that in past years the software giant found that attending two Comdex shows per year was too much, and the timing of the spring show was better for product announcements.

Still, there are those who elect to sit on the beach rather than join everyone in the waves.

Clone vendor Leading Edge Hardware Products, Inc. in Canton, Mass., will once again pass on exhibiting at the desert show but will attend to meet with key distributors and dealers, according to the company.

"Leading Edge had exhibited in the past but has not returned as an exhibitor for the past three years," a company spokeswoman said.

She added that Leading Edge prefers to spend its trade show dollars on smaller shows and more personalized meetings with its distributors and dealers rather than "being one dealer in 1,800 at Comdex."

ALAN J. RYAN

Comdex

FROM PAGE 1

after a two-year absence, some observers said they expect to see many products for Apple's Macintosh on display as the battle between Apple and IBM heats up.

Among those looking for products for the Macintosh will be Tom Jacobs, chairman of the board at Computer Town in Nashua, N.H., who said he is particularly interested in software packages and scanners for the Mac. Apple spokesman Rick Myllenbeck said his company intends to demonstrate "that Apple products connect with the IBM and compatible world."

Interest in applications for OS/2, the operating system being developed by IBM and Microsoft Corp., does not rank high among the reasons people are drawn to Comdex. "There are no applications out there yet to take advantage of the expanded memory and larger disk space" that OS/2 will be able to utilize, Jacobs said. "I think the general feeling is that [OS/2] is still in the distance and that the applications are two or three years away."

No recommendation

"The applications under OS/2 will be primarily ported applications, and I don't recommend them," Schneider said. "The initial cost [to set up for OS/2 applications] is $2,000 for most people, with the hardware upgrades and so forth. That's a lot of money to run Wordstar in a pseudo-multitasking environment."

Micropro International Corp. announced last week that it will demonstrate an OS/2 version of its Wordstar 2000 Plus word processor on the floor, and other software companies may follow suit. Jacobs said that while OS/2 will be important in a few years, there are other products he is more interested in today.

Carlos Frum, president of Northbrook Computers, Inc. in Northbrook, Ill., agreed. "Am I going to travel 2,000 miles to see vaporware? If someone wants to show me vaporware, I tell them to come to my office," he said.

Schneider said he is interested in Intel's Inboard 386 PC, an 80386 card that plugs into an IBM Personal Computer XT and gives it the power of a 386-based machine.

Vendors expected to introduce 386-based systems include Unisys Corp., Datavue Corp. and Blue Chip Electronics, Inc. Computer Town's Jacobs said he would spend his time looking at educational and home software for low-end PS/2 models, which he says are selling in higher volume than high-end models.

Charles Myers, president of the Personal Computer Center in Overland Park, Kan., said the main reason he will attend the trade show is to meet other people in the industry. "I don't have to go to Comdex to see new products," Myers said. "If you're an established dealer, you're not looking for new products."

Apple's Myllenbeck said his company is hoping to spend a great deal of time with value-added resellers and dealers at the show, "to gain their interest and do some recruitment."

Myllenbeck said Apple believes Comdex has remained a dealer and reseller show. "Certainly, there are third-party developers and end users, but the audience is not as strong in those areas," he said.

But many observers said the percentage of end users present grows with each Comdex show.

Northbrook's Frum said he will not attend Comdex this year because of the shift in audience. "I meet more of my customers than I do my vendors" at the show, he said. "My vendors are too busy talking to my customers."

Dick Schwab, vice-president of The Interface Group, Inc., the show's sponsor, said just 5% of last fall's Comdex attendees were people who classified themselves as end users, and he expects the number to remain at 5% this year. But some exhibitors said the ratio was closer to half resellers and half end users last year.

"It's not just a bunch of dealers running around, and it's certainly not a lot of local end users either," said Esther Dyson, editor of the industry newsletter "Release 1.0."

"The show has broadened beyond what you sell at retail," Dyson said. "You have people there who don't sell through dealers showing their products."

Changing focus

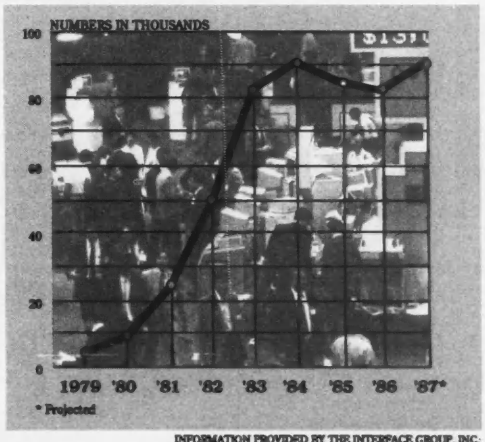
Schwab said the trend at the show is moving away from traditional retailers and dealers and toward "upscale value-added resellers," which he described as those who "were formerly doing just hardware and software but are now doing local-area networks and after-sale service and support."

The Interface Group estimated that attendance for the show will be 90,000, with some 1,500 exhibitors. Last year's fall show attracted approximately 82,000 attendees and 1,200 exhibitors. Some exhibitors showing products that were not on last year's Comdex list include Lotus Development Corp., Prime Computer, Inc. and Apple.

"The show is sold out for exhibit space" in each of its seven locations, Schwab said. "We've taken all of the support service areas [formerly used as information centers for buses, hotels and the like] and sold them as exhibit space. We've moved the support services into tent space."

Desert droves

Attendance at Comdex/Fall '87 is projected to be almost as high as in 1984



INFORMATION PROVIDED BY THE INTERFACE GROUP, INC.
CW CHART: MITCHELL J. HAYES

Network loads soar while stocks plunge

BY KATHY CHIN LEONG
CW STAFF

Wall Street investors were not the only ones thrown into a panic when the stock market plunged 508 points last Monday. Across the nation, managers of voice and data networks at stock exchanges and financial service companies scrambled to ensure that their computers would pass the acid test.

Most systems held up amazingly well under the unprecedented barrage of trading activity, according to users.

The public obsession with information triggered the overload. "People acted crazy because they wanted to know what their net worth was, and they couldn't find out because the [voice and data] lines were busy," one communications manager observed. "It seemed as though everyone on Wall Street picked up their phones at the same time. People's desire for information that day was insatiable."

AP/WIDE WORLD PHOTOS

Traders on the floor *of the New York Stock Exchange stare at monitors as the Dow Jones industrial average took its sharpest loss in history.*

For commercial computer systems that support the stock exchanges, Black Monday was a day on which all the cliches about memory, manpower, backup, power protection and extra trunk lines came too close to home. "We experienced usage levels we thought wouldn't come until the 1990s," remarked Dick Levine, vice-president of information services at Dow Jones News Retrieval Service.

Vendors of on-line stock quote services were faced with difficult decisions when the level of computer traffic skyrocketed to astronomic proportions.

Sweating it out

Tony Cronin, president of Wang Financial Information Services, was sweating it out when, at 10 a.m., he made the decision to separate the two backup Tandem Computers, Inc. machines at the data processing center and use them with the other five Tandem Nonstop systems. "I knew it was risky, but it was a gut decision that I felt I had to make," he said.

New York-based Wang Financial, which has an installed base of 2,200 terminals nationwide at customer sites, provides current stock trading quotes to brokerage houses such as Merrill Lynch & Co., Shearson Lehman Brothers, Inc. and E. F. Hutton & Co. Cronin was lucky.

Competitor Quotron Systems, Inc., a Los Angeles service that boasts of holding more than 65% of the stock quotation market, survived the day virtually unscathed. According to George Levine, Quotron vice-president of marketing, the Quotron 800 and 1000 minis based in New York are already capable of handling 600-million-share days.

There were concerns at Chicago-based PC Quote when its Securities Industry Automation Corp. (SIAC) computers fell behind. The SIAC computers maintain information on equity exchanges for the Dow Jones industrial index, for instance. "When those computers fell behind, we did too," noted David George, PC Quote executive vice-president. "When you see data suddenly stopping on the terminal, you wonder who dropped out." Unlike other stock quote services, PC Quote does not use large systems. Data from the exchanges is transmitted via 9.6K bit/sec. lines to 10 IBM Personal Computers at the Chicago site. From there, information is transferred to users over satellite links.

As MIS managers struggled to maintain computer opera-

Continued on page 146

Industry teeters after market quake

BY DOUGLAS BARNEY
CW STAFF

Last week's record-breaking stock market plunge may push the computer industry back into a slump, with mainframe systems facing the largest potential hit, some analysts said.

Last Monday's 508-point drop in the Dow Jones industrial average and the resulting confusion and decline in consumer confidence could stifle automation plans and put a cap on the booming computer industry. And according to some investment firms, things will get worse before they get better.

Last week saw the fortunes of many vendors fall. The once high-flying stock of Digital Equipment Corp. dropped 42 points in one day. The bluest of the blue chips, IBM, plummeted more than 30 points. By close of the market Friday, IBM was still down more than 14 points, selling at 120¾, and DEC was down 45 points, selling at 127.

These troubles for the computer industry may have an equally adverse effect on customers, especially if the fall of stock prices portends a severe — and some say overdue — economic recession. With stock values sinking, suppliers may have difficulty raising cash through stock offerings, the rate of computer product development may slow, and the health of key suppliers may be imperiled, some observers said.

In fact, Goldman, Sachs & Co., which had been calling for 2% to 2.5% Gross National Product (GNP) growth for 1988, now forecasts a mild recession.

Stiff upper lip

Major vendors showed a stiff upper lip in the face of economic uncertainty and the very real threat of a recession. "Plans for computer acquisitions are done on a long-term basis. I don't think these hiccups will have an effect," said John C. Butler, Honeywell Bull, Inc.'s executive vice-president of U.S. marketing, sales and service. "In a downturn, people buy computers to increase productivity." Others, however, noted that the slowdown in capital spending in 1985 pushed the computer industry into a slump.

And because computers have become a critical strategic and competitive weapon, some, like Butler, said they believe the industry can survive an economic crisis. "Computer firms are somewhat less vulnerable," said James R. Solloway, director of economic research at Argus Research Corp. "Manufacturers have rediscovered the importance of being on the technology edge."

Mainframes could suffer

The mainframe market is currently the most threatened. "When the economy is not growing, businesses do not need more horsepower," explained Daniel C. Benton, a securities analyst focusing on mainframes for Goldman Sachs. "People with current mainframe applications do upgrade, but what happens in a recession is that you don't need to upgrade as much." According to Benton, the micro and minicomputer industries are better able to withstand a recession than the mainframe segment.

The world's largest computer firm and mainframe king, IBM, released an upbeat statement last week. "The volatility of the stock market is not related to the basic direction of IBM's business, which continues to improve. We remain confident about the long-term prospects for IBM and the industry," the statement read.

Although larger, more expensive host computers are the most vulnerable to slowing or actual declines in capital spending, the dynamic microcomputer segment is far from immune. "It is clear that microcomputers are being purchased in large quantities by large concerns. If they got the squeeze put on them, they would slow down [personal computer purchasing]," said Microsoft Corp. President Jon Shirley. Shirley, however, remains optimistic. "We see nothing to indicate that business is doing anything but continuing to boom."

'Takes out some fizz'

A prominent micro industry venture capitalist expects both good and bad. "The economy will probably be adversely affected by the reduced wealth of the populace. That will take some of the fizz out of anything that depends on the economy," said Ben Rosen, a partner in the venture capital firm Sevin Rosen Management Co. Despite the probable downturn, Rosen said he believes the PC industry will remain relatively unperturbed. "The worst case for the PC industry is that the growth rates could be somewhat reduced," he argued.

Some vendors were hurt more than others in last week's market debacle. It got so bad for DEC that its stock did not open for trading until 2 p.m. last Tuesday.

According to Brad Allen, an investor relations spokesman, the Securities and Exchange Commission held up trading because of the large gap between the stock's bidding and asking price. "There was such a wide spread, they couldn't make an auction," Allen said.

The market problems will dash the dreams of many startup firms hoping to cash in on early success, as initial public offerings (IPO) become a distant memory. "The IPO window is shut for a while," venture capitalist Rosen said.

MIS awaits economic ripples; braced for cuts, slowdowns

BY DAVID A. LUDLUM
CW STAFF

MIS managers reacted cautiously to the stock market crash and subsequent gyrations, attempting to gauge the impact on systems departments should the result turn out to be an economic slowdown or at least a corporate belt-tightening.

A relatively direct impact could occur if an economic slowdown were to cripple a financially vulnerable supplier, such as a small software dealer.

"It might cause some small suppliers to go out of business, if they're heavily leveraged and have a lot of payments to make," said Robert R. Bohannon, vice-president of information systems for Emery Air Freight Corp.

"All of a sudden, this software house you're dealing with is no longer there," echoed a DP manager at a large regional bank, who requested anonymity.

A slackening of the economy could also affect systems departments through corporatewide budget tightening or shifts in priorities, managers said.

"A lot of the companies whose stock fell will use the sudden decrease in their market value to do some budget cutting, which they wanted to do before but could not justify. Now they have an excuse," said Martin J. Lynam, manager of data systems for R & F Coal Co. in Cadiz, Ohio.

Wall Street's condition "could have a harmful effect on the economic situation in general; it may cause some priority changes in terms of where the project emphasis is," said the MIS planning manager of a large garment manufacturer, who asked to remain anonymous. "It may be that we have to put an emphasis on projects that conserve assets and keep inventory under control, projects of a conservative nature," he said.

Managers noted, however, that any such fallout assumes that the stock market dive affects the economy, which is far from certain, and depends on the timing and extent of a rebound.

Congress to probe 'program trading' impact

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Concerned that computer-aided trading of large blocks of stock may have accelerated last Monday's stock market collapse, a congressional panel launched an investigation to determine if the practice of "program trading" should be regulated.

U.S. Rep. Edward J. Markey (D-Mass.), chairman of the House Subcommittee on Telecommunications and Finance, said the investigation would cover the economic causes of the market's plunge as well as "technical factors such as program trading which drove the velocity of the market."

Program trading, also known as stock-index arbitrage, is a complex technique traders use to execute simultaneous, computer-guided trades in stocks and stock-index futures.

Steps after the crash

"The subcommittee will dissect the numerous components of program trading to determine what regulatory measures are needed to reduce the risks of these trading practices or whether our financial markets would simply be better off without stock-index futures," Markey said.

In addition, David S. Ruder, chairman of the Securities and Exchange Commission (SEC), ordered an investigation to determine "what steps should be taken to ameliorate future market volatility."

After Monday's crisis, the New York Stock Exchange barred traders from using its high-speed order-delivery system for some forms of program trading in an effort to reduce the processing load on the exchange's computers and to help stabilize the market.

The first task for federal investigators is to determine whether program trading really did accelerate the market plunge; some reports suggested that very little program trading took place last Monday.

No one claims that program trading caused the crisis, but "there is a general consensus on Wall Street and in Washington [D.C.] that the stock market would not have fallen as far as it did, as fast as it did, if there had been some safeguards in place to limit program trading," said Julie Sedky, a political analyst at EG & G Washington Analysis Corp.

Regulations ahead

Federal officials will try to regulate program trading, Sedky predicted, "but they will find it easier said than done."

Karen Kraus Vignare, a political analyst at E. F. Hutton & Co. said Congress may eventually transfer regulatory authority over stock-index futures, a component of program trading, from the Commodity Futures Trading Commission (CFTC) to the SEC on grounds that the CFTC lacks the necessary expertise.

Some of the commentary immediately after Monday's crisis suggested that computer technology was a culprit. Sen. John Heinz (R-Pa.) said the suspension of program trading "will at least temporarily unwind the death spiral into which mindless, computer-driven algorithms have driven the market."

However E. F. Hutton's Vignare said, "The immediate and easy response is technology bashing. 'Later, the response will be that there is more than technology involved, and there will be more focus on the securities transactions."

Stock crash

FROM PAGE 1

York, a record volume of 608 million shares on Tuesday overshadowed normal levels of 200 million, for which the system was designed.

Wrinkle in time

"In many cases, the information that stockbrokers wanted simply did not exist," said Dan McGuire, corporate manager of systems and programming at the Midwest Stock Exchange. "The specialists on the floor did not have time to react to the overflow of information, and the prices they saw on-screen in many cases did not reflect reality because of the delays in the systems." Floor traders at some exchanges had to resort to manual record keeping as systems lagged behind.

Most exchanges had to reprogram the size of their output files to contain the data. Often, reprogramming was done on the fly, between trading sessions. At most exchanges, however, order clearing stretched into the early morning hours.

From New York to Chicago to San Francisco, stock exchange computers ran uncomfortably close to their limits. "The computer systems creaked a little bit at 95% of capacity, but they kept running," reported Bob Andrews, senior vice-president of the Boston Stock Exchange, which runs three Stratus Computer, Inc. systems. The Midwest Stock Exchange's twin Digital Equipment Corp. VAX 8650s and the Philadelphia Stock Exchange's three IBM System/88s also kept running.

In many cases, MIS managers said, it was the I/O devices and the people that could not cope with record-high transaction volumes. "The computers held up pretty well," said W. H. Anderson, chief information officer and senior vice-president of Prudential-Bache Securities, Inc. in New York. "The hard parts were when you had orders that did not match, phones that were not answered and a workday that did not end until 1 a.m."

The new workday began just six hours later, at 7 a.m. The Midwest Stock Exchange's McGuire said, "We were glued to our control room day and night. We ate so much pizza that I never want to see another slice again."

Breakdowns were, indeed, reported. At the close of the high-pressure week, New York's Securities Industry Automation Corp. (SIAC) announced that it would close trading at 2 p.m. — two hours early — on Friday and today to process backlogged orders for the NYSE and Amex.

The troubles at SIAC began Monday, when several of its 200 Tandem Computers, Inc. processors halted during the market surges. But the Tandem system's fault-tolerant design allowed SIAC systems operators to extract the incomplete transactions from backup processors, according to Jim Squyres, vice-president of SIAC. "We did something we did not think would be possible," he said. "Files might have overloaded, and the tickers ran late, but we were handling up to one [million] to two million computer transactions per second."

Upgrades to many systems were already planned when last week's stock deluge hit. The Pacific Stock Exchange's 8-year-old Scorex trading system, designed to handle 25,000 transactions per day, was handling 40,000, according to John Parady, president of the exchange's Data Processing, Inc. subsidiary. Two months after arriving at the exchange, Parady was in the process of upgrading the system, a project planned for completion more than a year from now. "I was anticipating the problem," he said. "Now, I'm tuning systems on the fly."

20/20 hindsight

In view of last week's activity, each exchange is reexamining its capacity planning.

Some exchanges just could not wait until this week to install new machines. At the Midwest Stock Exchange, several new Tandem processors were snapped into place within existing Tandem cabinets. Two new disk drives were wheeled in Wednesday night.

The experience of last week, said Prudential-Bache's Anderson, was something akin to marching into battle.

"It is kind of like going to war," he said. "Now that we've been there at levels of 600 million shares or more traded in New York, we're never going to be unprepared again. Now, we're going to decide what kind of armaments we'll need for the next time."

Systems get a breather

The stock exchanges closed two hours early Friday and will do so Monday and Tuesday as well, according to Richard Leyh, executive vice-president and chief administrative officer of Securities Industry Automation Corp. (SIAC).

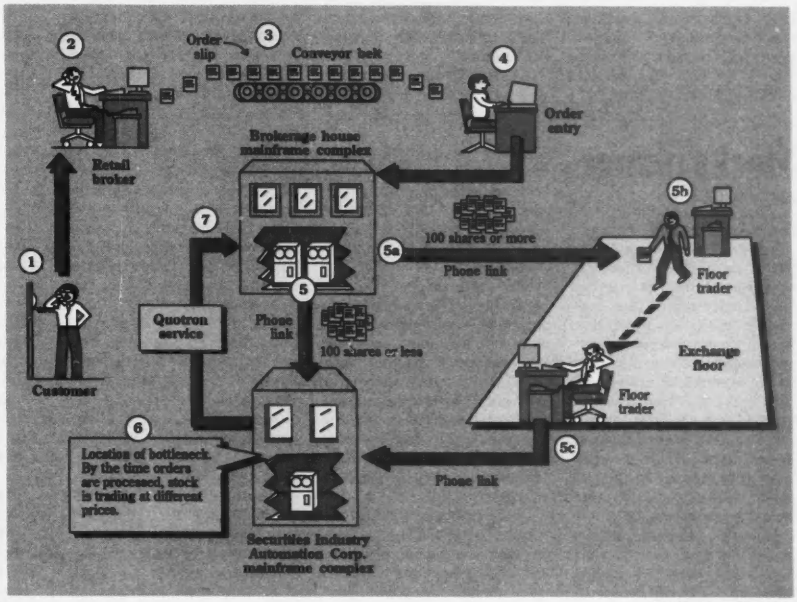
SIAC will work this weekend to clear operations. "The system can handle the load, but the people are getting a little weary," Leyh said.

SIAC has already added Tandem Computers, Inc. processors to the almost 200 processors that keep the system running and plans to add more, according to Leyh.

STANLEY GIBSON

Anatomy of a trade

In typical New York Stock Exchange transactions, small orders go directly to exchange computers, while larger orders first go to the trading floor



CW CHART: MITCHELL J. HAYES

AT&T warms to price caps

WASHINGTON, D.C — AT&T last week threw its support behind a Federal Communications Commission plan to establish price ceilings for AT&T long-distance services. That plan would replace current regulations that limit the company's earnings capability.

Despite lauding the price cap as a step in the right direction, AT&T asked the commission to "move promptly to institute a program of regulatory oversight for AT&T." AT&T said such a program would more accurately reflect the competitive state of today's long-distance market.

A regulatory oversight process would best permit the industry to rely on competitive market forces to assure that customers continue to receive fair and reasonable prices, AT&T said. Under this process, AT&T said rate-of-return regulation would be replaced by a streamlined tariff process that would allow AT&T to offer services quicker and at lower prices.

Novell OS/2 plan hazy

BY PATRICIA KEEFE
CW STAFF

DALLAS — To the disappointment of some attendees, network software vendor Novell, Inc. did not use its second annual trade show as a platform to clarify its strategy for dealing with Microsoft Corp.'s LAN Manager and Microsoft and IBM's OS/2.

The Networld conference, which is devoted to Novell's Netware operating system and compatible products from third-party vendors, was expected to draw 6,000 attendees.

Roughly 500 users left a standing-room-only session on OS/2 and networking without any better understanding of Novell, IBM or Microsoft's network strategy than they had before they entered.

Third-party privacy

IBM did not even show up at the session, and a Microsoft representative only reiterated Microsoft's standard LAN Manager presentation.

David Melin, Microsoft's product manager for systems software, told attendees the LAN Manager is on target, but later he dodged a question about how many third parties have announced support for the LAN Manager. So far, only development partner 3Com Corp. has announced plans to support the product.

However, sources close to Microsoft said it will soon announce agreements with two third-party vendors to provide Transmission Control Protocol/Internet Protocol and Open Systems Interconnect support under the LAN Manager.

One user pressed Craig Burton, Novell's vice-president of corporate planning and development, to respond to a recent report that Novell intends to use features of IBM's Micro Channel architecture to connect Netware and OS/2.

Burton confirmed that using a coprocessor board inside IBM Personal System/2-based servers to run OS/2 applications is one of several options available to Novell. However, he denied that Novell has decided to choose that option.

Stocks plunge

FROM PAGE 144

tions, voice network managers were keeping a close watch on their switches. Surprisingly, New York Telephone reported that Monday represented business as usual. No major lines went down as a result of the frenzied trading activity. "A lot of people were asking us about the work load, but it was normal, as it always is in the financial market," a New York Telephone spokeswoman said. "Our technicians were monitoring the networks here very closely, but things were very smooth."

However, telephone lines at stock brokerage houses were busier than ever. At Charles Schwab & Co. in San Francisco, callers to the main office got an almost constant busy signal. "The trunks were all maxed out," said Mike Ryan, Schwab's manager of network services. But the three Rolm central branch exchange voice switches bore up under the load, which sustained more than 125 simultaneous calls that day.

'Worn out'

While the machines did not break, the people manning them nearly did. Nearly 100 stock brokers and quotation personnel were pushed to the limit in responding to trading and quote requests. "The switchboard was so crowded with callers wanting to make trades that our staff couldn't keep up," Ryan said. "People were worn out like never before."

The desperation for information got so out of hand that people waited on the line as long as half an hour to talk to a broker. On Tuesday, the phone lines were busy at 5:30 a.m. — an hour ahead of the usual gridlock.

The same held true for callers waiting to get through to Automated Data Processing, Inc. (ADP) in Roseland, N.J. "The PBXs were flooded with calls, but we were able to handle 99% of the traffic," reported Joe Gallo, ADP manager of voice networks and tariff analysis, referring to the firm's private branch exchanges.

Anxious investors' calls flooded the lines at Dow Jones News Retrieval Service as well as the Dowphone voice quote service, Levine of Dow Jones noted. While the previous Friday's unusual stock activity was a precursor of things to come, Levine and his team were unprepared for the Monday shock.

The multivendor computer systems dedicated to the service were slowed by the number of callers trying to access it. "As soon as one port opened up, it would get filled," Levine explained. "And not only did it get filled, once people finally got into the system, they did not want to let go. Their need for information seemed to be like a lifeline."

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INSIDE LINES

Weak Signal. Lotus's Signal, a system for tracking stock prices, obviously was not designed with today's conditions in mind, users discovered last week. The product was only built to handle market declines of up to 99 points. Last Monday's 508-point plunge was too much for the system, which threw data that depends on Dow Jones figures out of whack. But never fear. Lotus has programmers working on a correction.

Everything's relative. Software AG is expected to try to reposition its Adabas data base management system as a multipurpose, object-oriented management system as well as an inverted list product during its upcoming users group meeting Nov. 2-5 in Miami Beach. Software AG officials have been reported as saying that Adabas, which organizes data in tabular format, will receive added relational features in its next release. The Reston, Va., firm is attempting to offer a single product to users who think they need more than one DBMS. In addition, Software AG will announce its entry into the computer-aided software engineering tool market at the users group gathering.

Production line starting. MSA Advanced Manufacturing inked a deal last week with Tandem to jointly develop a real-time factory floor control system. The modular system will include Tandem's version of SQL.

Sharks will be circling. Microsoft and 3Com are throwing an exclusive get-together at The Shark Club in Las Vegas during Comdex/Fall '87 and have invited what amounts to a "Who's Who" in the computer industry. The subject of the schmooze will be the OS/2 LAN Manager, Microsoft and 3Com's networking project. On the invitation list are key developers from Ashton-Tate, Borland, Lotus, Wordperfect, Adobe, Compaq, Hewlett-Packard and Intel, to name a few. One wonders who will be hungriest — the sharks in the huge aquarium surrounding the club or the developers on the floor.

Can't eat just one. NEC Electronics, Inc. last week won a skirmish with Intel in their long-standing microprocessor dispute. NEC won a preliminary injunction that halts Intel's efforts to keep NEC's V series of microprocessors from entering the country. Intel and NEC have been fighting out the issue of microcode and patent infringement violation since 1984, with Intel alleging that NEC's V chips unlawfully emulate Intel's 8088 and 8086 chips. Earlier, Intel had won its own skirmish when a judge ruled that microcode was copyrightable. But then it was discovered that the judge held a small amount of Intel stock through a stock ownership club, and . . . oh, never mind.

Market premium. Telex Corp.'s board of directors last week deferred a response to Asher Edelman's $65 per share, $875 million hostile takeover bid, citing the unsettled stock market. Tom Linkas, an analyst with L. F. Rothschild & Co., has predicted that Edelman may end up selling his majority stakes in both Datapoint and Intelogic Trace to Telex. In the market turmoil last week, Telex's stock price had fallen to the high 40s by week's end.

Spliced lines? Contrary to popular belief, AT&T's System 85 will not be discontinued, nor will it be swallowed by the System 75, AT&T subsidiary Bell Laboratories told a group of analysts recently. Instead, AT&T says it plans to merge the best features of both of its major private branch exchange lines, providing a system with a common software base, port architecture and family of peripherals. Bell Labs claimed that it has "found a technical way to combine the System 75 and System 85 based on computer technology," says Doane Perry, an International Data Corp. consultant.

Just what IBM needs. A communications manager at a Fortune 500 company reports that he has an AT&T technician's assurance that the vendor is working on his request for an Integrated Services Digital Network interface to IBM's 3725 front-end processor. The interface would include software to allow users to manage a 3725-based network through an AT&T system — probably the Unified Network Management Architecture.

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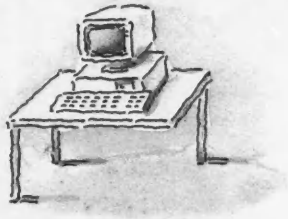

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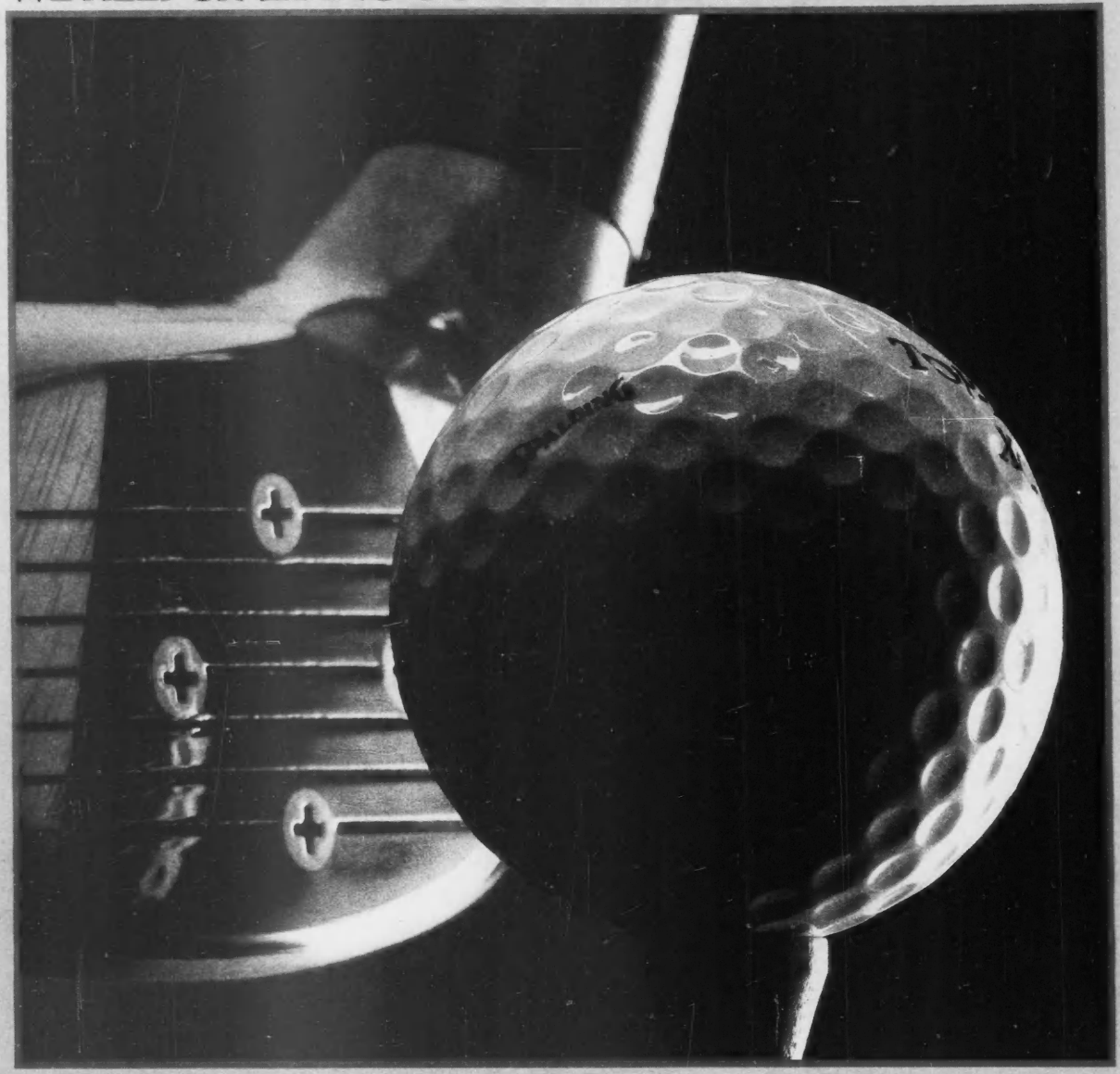

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